





SUPPL. B. 61013/E

MEMOIRS

FOR THE

INGENIOUS.

CONTAINING

Several Curious Observations in *Philosophy*,
Mathematicks, *Physick*, *Philology*, and other
Arts and Sciences.

IN

Miscellaneous Letters.

By *J. DE LA CROSE*, E.A.P.

JANUARY, 1693.

To be continued Monthly.

VOL. I.

————— *Erat quod tollere velles*
Garrulus atque piger scribendi ferre laborem
Scribendi rectè, nam ut multum nil moror. Hor. serm. l.i. sat. 4.

————— *Cui non sit publica vena*
Qui nihil expositum soleat deducere, nec qui
Communi feriat carmen triviale moneta. Juven. sat. 7.

LONDON, Printed for W. Rhodes near Bride-lane in Fleet-street;
And for J. Harris at the Harrow in the Poultry. 1693.

THE E. A. H. S.

17th Nov 1872

Received of the Hon. Secy of the
Treasury for the sum of £1000

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ADVERTISEMENT.

SUCH as have any Books, Letters, Memoirs, or other Papers to communicate to the Author of these *Memoirs*, are intreated to send them to the *Latin Coffee-house*, in *Ave-Maria-lane*, near *Ludgate* : and defray the charge of Carriage.

An ingenious Gentleman having undertaken to write a *General History of Fountains*, he desires the Assistance of the Learned, in order to finish so useful a performance. And therefore if any have Advices, Experiments or Papers of the like Nature, to impart to him, he is intreated to send 'em to the Author of these *Memoirs*, under the former direction. Or if any had the same Design, and had so far advanc'd it, as to be ready for the Press, he is desired to give notice of it to the said Author, that his Friend may desist from a fruitless Undertaking.

WATTS & WATTS

With a view to the
improvement of the
art of printing, and
the convenience of the
public, the following
arrangement has been
made.

The first part of the
work is a general view of
the principles of the
art, and the second part
is a description of the
different kinds of
presses, and the
materials used in
the art. The third part
contains a description of
the different kinds of
type, and the fourth
part contains a description
of the different kinds of
ink. The fifth part
contains a description of
the different kinds of
paper, and the sixth
part contains a description
of the different kinds of
binding.

Memoirs for the Ingenious,

JANUARY 1693.

LETTER I.

ARGUMENT.

The difficulty of writing Journals: What can make 'em of a long standing. Occasion, Method and Matter of these Memoirs. An Invitation to our Virtuoso's. Various opinions about the Original of Fountains. Observations of Mr. Sedileau, a Member of the French Academy of Sciences, concerning the quantity of Rain-water, and that of its Evaporation.

S I R,

I Fear you will never leave off quarrelling with me for having discontinu'd the Writing of the *Works of the Learned*. I have discover'd to you as to an intimate friend, the particular causes of my disgust, which the publick is not concerned to know. This only I shall repeat here, that Experience has taught me the perfect establishing of a Journal, so as I understood it, is not the performance of private men. And therefore we see a vast difference betwixt the Journals that have been set up in several Countries, as to their success and continuance. The Journals of *Italy* have been laid down twice or thrice. The *News from the Republick of Letters*, tho undertaken by an incomparable *Genius*, has been but of five or six years standing: the *Universal Bibliothek* has lost its two first Authors, and is but a Skeleton, if I may speak so, of what

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it was before : The *History of the Learned*, published at Rotterdam, by a most ingenious Pen, is fallen from a monthly to a quarterly account of five or six sheets ; whereas the Journals of *France* and *Germany*, whose Authors are encourag'd by their Princes, grow every day better, especially the first, since the *French King*, at the perswasion of that great Minister *Louvois*, has bestowed a Pension upon three or four learned men, to pursue that undertaking.

Societies erected for the promoting of Learning have almost undergone the same fate, for the *Royal Academy of Sciences* at *Paris*, whose chief members have either Offices, or a competent Allowance from that Monarch, besides the great works they are upon, and publish from time to time, have since a year begun to give out small, but most valuable observations, upon such Subjects as occur to them in all parts of Philosophy, Physic and Mathematics. And such acceptance have their Memoirs found among their Nation, that whereas at first they were printed monthly, they began to publish them every fortnight, on the 15th of *March*, 1692, and have often continued on that foot.

We have here a Royal Society too, and compos'd of as able and ingenious men as any in the World ; however since the Death of the Learned and Industrious *Oldenburg*, we have seen but few of their Papers. Not that they have discontinu'd their ingenious inquiries and observations, or that they esteem the World unworthy of communicating 'em ; but it seems that the *English Tongue* being circumscribed within the narrow limits of this Nation, the Sale of such Books, as are only fitted for the use of the most curious and thinking sort of People, will not allow a sufficient Reward to the Undertakers. In the meantime, nothing can more contribute to the progress of Learning, than the speedy publishing of small papers, which contain new inventions or rare observations ; for tho' their Authors, should be glad to be taken for what they are, yet as the learnedst are ordinarily not the richest sort of men, so they are loth to appear on the public Stage, at the expences of their Purse, as well as of their Wit.

Besides there are but few, who have so much time to spare, as to write huge Volumes, and they know that flying Sheets and Sixpenny Books, are as soon lost as printed ; which things being all put and considered together, it will not seem strange, if the Learned be thereby discouraged from publishing their Works.

These Reflexions and your Earnestness have at last determin'd me to send you these *Memoirs* in the form of *Miscellaneous Letters*. I have several Treatises lying by me, which I am neither minded, nor at leisure

leisure, ever to enlarge into a Book. Besides I have the *Journal of Paris*, and the *Physical and Mathematical Memoirs* of their Royal Academy, of the last year, and I am promised that those of the present year shall be constantly sent to me every fortnight by the Post; so that unless some unforeseen accident should hinder the Effect of my good will, you may be sure to receive from me every month at least, if not oftner, a Book of this bigness.

But I hope our ingenious *English Men* will not put me to such straights, as continually to borrow from our Enemies the matter of a Philosophical Entertainment. For tho the Lovers of Wisdom can never be at real feuds, yet there may be a noble emulation, and lawful strife, between two neighboring Nations, which of them shall contribute more to the discovery of the Truth, and the perfection of Arts and Sciences. Let then our *English men* show themselves as brave at the Pen, as at the Sword; and we may be sure of getting the Victory in this kind of spiritual fight. As long as the *Philosophical Transactions* have been constantly continued, they have been esteemed the best collection that ever appeared in the world; most of the Persons who have contributed to that excellent performance are yet living, or have been succeeded by others who may equal the Reputation of their Predecessors, so that I do not doubt, but if our Royal Society and other Learned men will help on the writing of these Memoirs, they may come in time to yield neither in curiosity, nor usefulness to those of the *French Academy*.

For tho I have mentioned these last Memoirs, the *Journal of Paris*, and several of my Papers, do not believe, Sir, that I will obtrude to the world, either Translations, Abstracts, or my own Composures; I look upon them only as a Forlorn Hope to begin the Fight, to raise up the Spirits of the Learned, or as a *Body of Reserve* to maintain it, and hinder this design from falling on a sudden. For this reason it is, that I have not inserted Divinity in the Title, being afraid that, as it is known, this is the part I am best conversant in, some men would be apt to believe, I designed to put upon them a Book of my own making. Notwithstanding as Christianity, excepting matters of fact, the moral part and the revealed truths, is the best Philosophy and purest Metaphysics, so, any Papers that shall relate to the reconciling of our Mysteries with sound Reason, or the differences among Christians, explaining an important passage of the H. Scripture, or of any prophane Author; in a word, all what is new, short and rare, and may make men more learned and good, *Nostri est farrago libelli*, seems to me fit *Memoirs for the Ingenious*.

But not to detain you any longer with Prefaces, you have often ask'd my opinion about the original of Fountains and Rivers; whether they were formed and kept up by the Rain, or whether they proceeded from the exhalation of Vapors, driven up from the bottom of the Earth to its surface, by the fermentation of Minerals and heterogeneous bodies, or by subterraneous fires? This question is not easy to be determin'd; for it depends upon many previous inquiries and experiments, as whether the Earth is so exactly and regularly pierc'd through, in all the places which correspond to the Springs of Rivers; that the Vapors rais'd by this Fermentation and Fire, may go up and pursue their way without hinderance, till, at the top, or the foot of Mountains, they condense and fall down into Water. This difficulty would incline me to the opinion of those, who make Rain the source and the store of Rivers, but that this Hypothesis is likewise liable to a great objection, *viz.* That the quantity of the Evaporation, surpasses by far that of the Rain, even in the wettest Countries. Besides that there are some as *Languedoc*, that are abundant with Fountains and Rivers, where it rains but very seldom, and the Snow that falls upon the Mountains seems not proportionable to the quantity of water that runs through the Channels of these Rivers. Add to this, that it is hard to conceive that such a constant effect as the source of Rivers should proceed from so variable a cause as the fall of Rain and Snow, which so sensibly differs in several Climates, Seasons and Years. These objections how strong soever they appear, are not altogether unanswerable, but cannot, methinks, be fully resolv'd than by natural experiments, and accurate collations between the quantity of Rain fallen within a certain time, and that of its Evaporation. And therefore I am minded to gather up all the experiments of this Nature, that shall come to me from known and ingenious hands, before I give you my last determination upon this matter.

I have happily met in the Memoirs of the Royal Academy, for *February*, with some Observations of Mr. *Sedileau* relating to this. He took two Pewter Cisterns, one, which was to receive the Rain, and to measure the quantity of that Water, had 2 foot in length, and 1½ in breadth and depth: The other that was prepared to observe the degrees of the Evaporation, was 3 foot long, 2 broad, and something above 2 high. He put each of these Cisterns into a Wood-cash broader and longer than the Cistern, and filled up the void space with Earth, to hinder, as much as possible, that no part of these Cisterns but their mouth should be exposed to the action of the Air, Wind and Sun. He set these Vessels upon the terrass of the Observatory:

January, 169²₃.

fervatory at *Paris*, in an open place, and having begun his Observations on the 1st of *June* 1688, he continued them to the last of *December* 1690, when a sickness of his interrupted the course of these experiments.

To measure the Rain-Water, he put, at one of the corners of the bottom of the Cistern fitted to receive the Rain, a Tap, by which as soon as it began to rain, the water fell in a *Cubical* Vessel 3 inches long, broad and high, which consequently contain'd 27 *Cubic* inches of water. These 27 inches of water lying level upon the basis of the Cistern, were found by calculation and experience, to be raised $\frac{1}{4}$ of a line above it, and therefore as often as this small Vessel was taken away, it was a sign that it had rain'd $\frac{1}{4}$ of a line high; and that the water should have no time to evaporate, it was measured as soon as it was fall'n, and the Cistern fully evacuated.

To take notice of the evaporation, he filled up the other Cistern to half a foot from its uppermost brink, lest the Vessel being too full, the agitation of the wind should spill the water. Every day the distance from the uppermost brink of the Cistern to the superficies of the water was measur'd, by the means of two rules, whereof one, which was pierc'd through the middle, lay horizontally and level upon the brink of the Cistern, and the other, which was divided into inches and lines, enter'd vertically into the hole of the first. Now to know how much Water had been evaporated within a certain time, as a month, he added to the quantity, mark'd by lines upon the Rule, the quantity of the Rain-water that was fall'n during that month, supposing it to be known, as having observ'd it, by the means of the other Cistern.

The result of his Observations are as follow.

Anno M D C L X X X V I I I.

Rain.			Evaporation.		
June	2	Inch. 9 Lin. $\frac{1}{4}$	June	5	Inch. 10 Lines.
July	1	Inch. 9 Lin.	July	5	Inch. 4 Lin.
August	0	Inch. 3 Lin. $\frac{3}{4}$	August	5	Inch. 4 Lin.
September	1	Inch. 7 Lin.	September	3	Inch. 2 Lin.
October	1	Inch. 8 Lin. $\frac{1}{8}$	October	1	Inch. 5 Lin.
November	1	Inch. 7 Lin. $\frac{2}{3}$	November	0	Inch. 8 Lin.
December	1	Inch. 9 Lin. $\frac{1}{2}$	December	0	Inch. 8 Lin.

Sum of the Rain	{	11	Inch.	6	Lin.	$\frac{1}{3}$	Sum of the Evaporation	{	22	Inch.	5	Lin.
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Anno

Memoirs for the Ingenious.

Anno M D C L X X X I X.

Rain.				Evaporation.			
January	1	Inch.	4 Lines.	January	0	Inch.	8 Lines.
February	0	Inch.	9 Lin. $\frac{3}{4}$	February	0	Inch.	9 Lin.
March	0	Inch.	9 Lin. $\frac{3}{4}$	March	1	Inch.	10 Lin.
April	1	Inch.	4 Lin. $\frac{1}{2}$	April	3	Inch.	0 Lin.
May	0	Inch.	7 Lin. $\frac{3}{4}$	May	5	Inch.	7 Lin. $\frac{1}{2}$
June	0	Inch.	8 Lin. $\frac{3}{4}$	June	4	Inch.	8 Lin.
July	4	Inch.	3 Lin. $\frac{1}{2}$	July	5	Inch.	3 Lin. $\frac{1}{2}$
August	1	Inch.	6 Lin.	August	4	Inch.	11 Lin. $\frac{2}{3}$
September	1	Inch.	8 Lin.	September	3	Inch.	2 Lin. $\frac{1}{2}$
October	1	Inch.	10 Lin. $\frac{1}{3}$	October	1	Inch.	3 Lin. $\frac{1}{4}$
November	2	Inch.	5 Lin. $\frac{1}{3}$	November	0	Inch.	11 Lin. $\frac{1}{3}$
December	0	Inch.	8 Lin.	December	0	Inch.	8 Lin.
Sum of the Rain } 18 Inch. 1 Lin.				Sum of the Evaporation } 32 Inch. 10 Lin. $\frac{1}{2}$			

Anno M D C X C.

Rain.				Evaporation.			
January	2	Inch.	7 Lines.	January	0	Inch.	8 Lines.
February	1	Inch.	2 Lin.	February	0	Inch.	6 Lin. $\frac{3}{4}$
March	1	Inch.	7 Lin. $\frac{1}{4}$	March	1	Inch.	6 Lin.
April	0	Inch.	10 Lin. $\frac{3}{4}$	April	3	Inch.	6 Lin. $\frac{1}{2}$
May	2	Inch.	6 Lin.	May	4	Inch.	8 Lin.
June	2	Inch.	3 Lin. $\frac{3}{4}$	June	4	Inch.	8 Lin. $\frac{3}{4}$
July	2	Inch.	8 Lin. $\frac{1}{3}$	July	5	Inch.	5 Lin. $\frac{3}{4}$
August	2	Inch.	11 Lin.	August	4	Inch.	2 Lin. $\frac{1}{4}$
September	0	Inch.	9 Lin. $\frac{1}{2}$	September	2	Inch.	6 Lin. $\frac{1}{4}$
October	2	Inch.	4 Lin. $\frac{1}{2}$	October	1	Inch.	10 Lin.
November	0	Inch.	10 Lin. $\frac{1}{4}$	November	0	Inch.	8 Lin. $\frac{3}{4}$
December	0	Inch.	4 Lin.	December	0	Inch.	6 Lin.
Sum of the Rain } 21 Inch. 0 Lin. $\frac{1}{3}$				Sum of the Evaporation } 30 Inch. 11 Lin.			

Mr. Sedileau farther observes,

1. That the greatest quantity of Rain, which is fallen during those 2 years 7 months, within the space of 24 hours, was 12 lines $\frac{1}{4}$ in height, June 20, 1688, and 13 lines at another time, July 13, 1689.

2. That

2. That some times, when the Rain seem'd pretty strong, and to have continued half a day long; however it was found that it had rain'd but 3 or 4 lines in height, because the drops were thin, and that Rain does not make up a considerable quantity of Water, unless the drops be somewhat thick.

3. That the greatest evaporation that has happen'd at *Paris* during that time, within 24 hours, has been 3 lines $\frac{1}{2}$, in the heat of Summer, the Sky being most pure and clear, and the Wind blowing North, North-East.

4. That Water is easier evaporated in a small Vessel than in great, provided they be alike in all other things.

5. That six inches of Snow give ordinarily but about an inch of Water, when the Snow is melted; which must be understood of the Snow in its natural state, and squeez'd only by its own weight. In the mean while, when the Snow falls in great flakes, as it is closer thrust together, so it makes up more Water than when the flakes are thinner.

6. If the Snow lye long upon the ground, during a great frost, and serene piercing weather, it diminishes sometimes a line and a half in height within 24 hours, both because it sinks down by its own weight, as that some parts of it evaporate, and that the heat of the ground melts it from beneath; so that the mass of the Snow comes at last to nothing, if the frost continue long.

7. The very Ice, how hard soever it be, steems out and diminishes during a frost, tho so insensibly, that its decrease cannot be perceiv'd but within the space of some days.

Out of these Experiments and Observations, you may infer, that the *Medium* of the quantity of the Rain, that falls at *Paris* within a year, is 19 or 20 inches, and that of the Evaporation is 30 or 31 inches. It were to be wished that some of our *Virtuoso's* would communicate us the Experiments they have made relating to this purpose, that we might compare both Climates, and know which of them is wetter or dryer, colder or hotter. This might likewise be extremely serviceable to decide the grand Question of the Original of Fountains; for though it seems at first improbable, that the degrees of Evaporation surpassing those of Rain by a third, the last should be sufficient to form and keep up Fountains; however the Gentlemen, who maintain that Opinion, know so well how to extricate themselves of this difficulty, as to retort it against their Adversaries; so that it will be fit that we suspend our Judgment, till we have heard the Reasons of both Parties, which I shall impartially relate in another Letter and another Month, having been long enough in this, upon this matter.

Jan. 5.

LETTER

LETTER II.

To the Honorable Sir R. S. P. of the R.S.

ARGUMENT.

Occasion and Method of this Letter. That the Terrestrial Globe is not perfectly round, but somewhat oval. What the Chaos was, and how it came to be formed into this Earth? That there were Mountains, Rivers, and open Seas before the Flood, and how they arose? How the Sea may have overflowed the Earth? How the Fountains of the Abyss were broken up, and furnished a sufficient store of Vapors to a 40 Days-rain? Considerations on the Effects of the Deluge, especially the shortning of Mens Lives.

Honorable Sir,

IT was too rash an expression to say that I might find out half a dozen Romances almost as ingenious as that of Doctor Burnet, concerning the Formation and Drowning of the Earth: however since your Honour has been pleased to take me at my word, and to command me to do it, I shall make bold to obey your Orders, and use my utmost endeavours to give you some satisfaction. Not that I believe I may be able to discover the Truth in a matter that can but be known *à Posteriori*, or by the reflexions we make upon the present state of things, which must be extreamly altered by the frequent Devastations, Inundations, and Earthquakes; without reckoning the insensible changes, which the Terrestrial Globe must have undergone, during near six thousand years, or perhaps more: Nevertheless, to hit as near the truth as possibly I can, I shall suppose nothing contrary to Reason and Experience, and much less to the Holy Writ.

The late Observations of the Pendules shortning or lengthning their Vibrations, as they are brought nearer to, or removed farther off

off from the Equator, assure us that the Terrestrial Globe is not perfectly round, but more extended in length East and Westwards, than towards the Poles; so that the Equinoxial is the longest circular line of this Globe, and the polar Axis its shortest Diameter.

Mr. *Hugens* in his book of the *Gravity*, calculates very exactly this difference, which may amount if I remember well to 16 or 17 miles on each side, so that I may reasonably suppose, that this our Globe is a kind of an Oval and not a perfect Circle: especially seeing that most of the new Philosophers agree that the Planets, amongst which they are pleased to rank the Earth, describe an Eclipsis about the Sun.

I suppose in the second place, that the Chaos was a confused mixture of Water and Earth, or to speak the Language of the modern Philosophers, a Compound of material Particles of different Figures, amongst which those that were round or oblong, transparent, slippery, small, and most proper for motion, may be comprized under the general name of *Water*, as those that were grosser, and of a more perplexed configuration under that of Earth.

When God had resolved to dispose this inordinate Mass into a regular World, the first thing he seems to have done, is to put it in motion, and at the same time instituting the Law of Gravity, the Particles of a more perplexed figure subsided towards the Center of the Globe, whilst the more moveable swam above the rest, or crept among the Cavities, which the corners of the grosser, and their irregular dispositions left betwixt them.

When the first commotion was somewhat abated: as the Particles of water are ponderous and sliding, and that they could not make their way towards the Center, being hindered by the solidity of the Earthly Mass, they ran towards the sides of the Globe; and as they approached the Center as near as they could, they expelled or carried before them such Particles of Earth, as were least able to oppose their motion. Thus the Ground came to be discovered, and Rivers to form their Beds, which they digged and enlarged more and more, as they went farther off from the tops of the Globe towards the sides of it, especially when many of them united their force by meeting together.

It follows from this Hypothesis, that there was no Mediterranean Sea, nor great wide Lakes, as the *Baltick* and *Caspian* Seas are thought to be; and that the Earth was encompassed with the Ocean. But as it appears by the Navigations that have been made round about the Earth, that it is still environed by the Sea: So I hope to make it sufficiently plain, that those great forementioned Lakes are an effect of the Deluge. I confess likewise that it does not follow from

my Hypothesis, that the Primitive Earth, had so many, and so high Mountains, as our Earth hath at this time; but I do not totally exclude them: First, because I suppose, that the gross particles of matter subsided unevenly; and left a great many Hills between them: Secondly, because those Hills, which at first facilitated the course of Rivers, were afterwards increased by their running thro them; which could not but dive the ground, level several inequalities, and enlarge the depth of Vallies. And 'tis easy to conceive, that the great changes made by *Noah's Flood*, and the following Inundations and Earthquakes, in the inward constitution and outward face of the Earth, may have produced divers new Mountains, or augmented the bulk of the old ones.

I shall not pursue to explain the mysteries of the creation, since its other works have no necessary connexion with the matter in hand, and therefore I shall immediately go over to the Explication of the Deluge.

The account *Moses* gives of the universal Flood, is more circumstantiated than any other remains of ancient History. However, as God designed this Revelation for the use of vulgar capacities; the sacred Author has only set down such matters of fact, as were necessary to understand the extent and moral causes of this Phænomenon, but has made no Philosophical Remarks upon them. It sufficiently appears, that the Divine Justice had decreed to exterminate Mankind, and to save only the just *Noah*, and his Family for his sake; that as he had resolved the Earth should be inhabited again, he made choice of the Water, as of a general instrument to destroy men, without utterly defacing their dwelling place.

The Holy Writ remembers two ways by which God effected this, viz. A Rain of 40 days and 40 nights continuance, or the opening of the Windows of Heaven, and 2^{dly}, the breaking up of the Fountains of the great deep. By this means the surface of the Earth, without excepting the highest Hills that then were, was covered 15 Cubits upwards, and the Waters prevailed upon the Earth during 150 days, after which they began to abate. But tho God had raised a great Wind to help the Waters to run down, towards their former place, yet it was but on the first day of the 10th month, that the tops of the Mountains began to be seen.

It is not easy to assign the natural causes of that great store of Vapors that produced a Rain of so long a continuance, for to suppose that it was preceeded by a proportionable heat and drought, is not agreeable to the Testimony of our Savior, *That men were at that time eating and drinking, marrying and giving their Daughters in Marriage, and that*

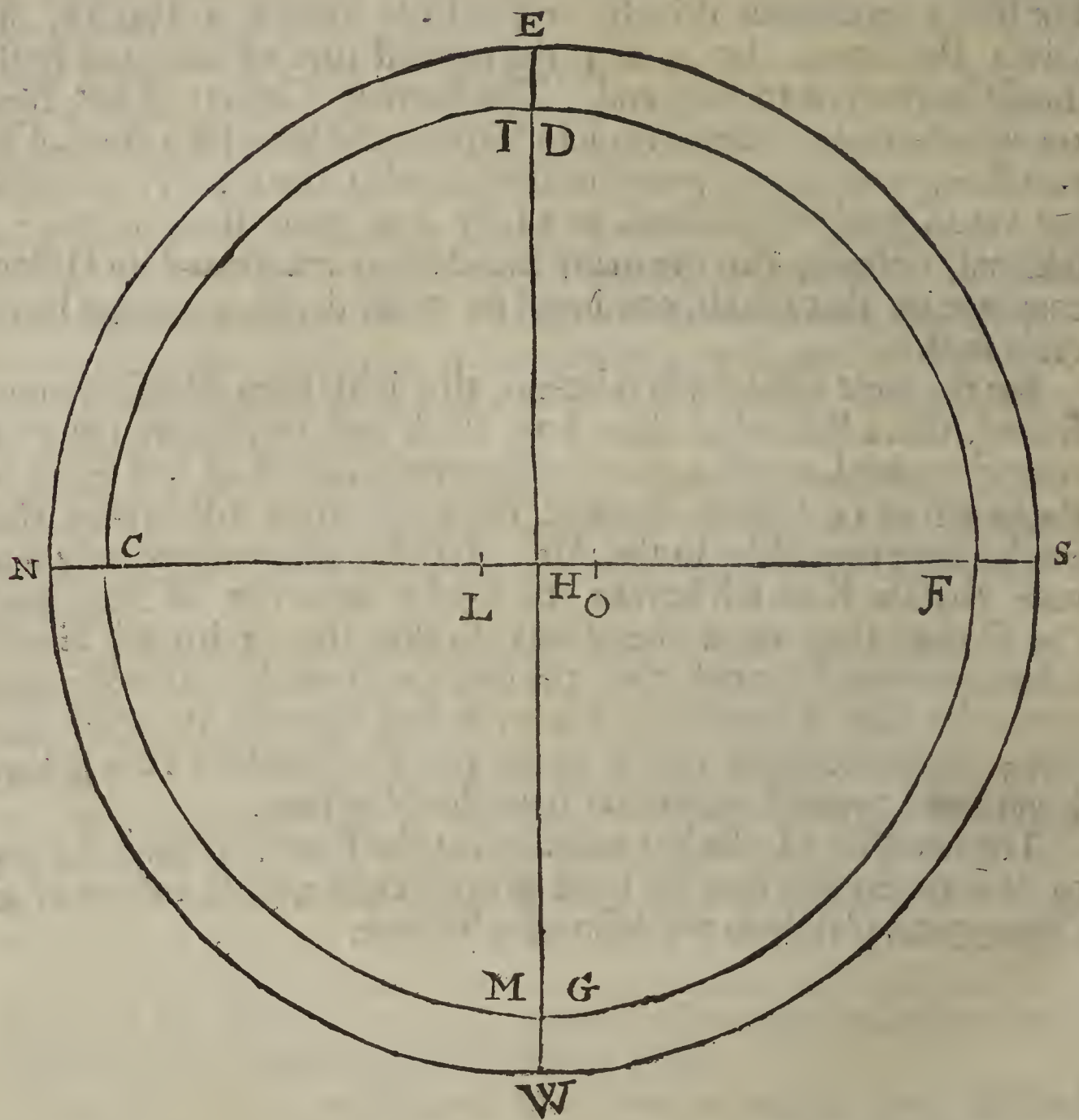
that they were not sensible of the Flood, till it came and took them all away. For such a prodigious driness, would have caused a Famine, and this a Pestilence, by which the greatest part of men and beasts should have come to their end. The burning Comets of Mr. Newton, which resolve themselves into Vapors, and serve for a store of future Rain, would come nearer to the purpose; but this Hypothesis is not yet so firmly established, as to lay any great stress upon it: I shall only observe, that the many Inundations mentioned in History convince us, that a Rain continued for many days has nothing incredible in it.

But the great difficulty lyes herein, that it has been plainly demonstrated, that a Rain of 40 days, how thick and prodigious soever it were conceived, could not cover the whole surface of the Earth to the height of 15 Cubits, because there are many Mountains that reach above two Miles in the Air. To solve this, we need only suppose, that the Rain fell heavier and thicker upon one of the sides of the Globe, than upon the other; so that the surcharged Hemisphere overweighing the other, the Sea that was then spread round about the sides of the Earth, ran over and drown'd its whole surface; which seems to be the reason that the Southern Hemisphere is yet more covered with water than the Northern.

The necessity of the Sea overflowing the Earth, if this last came to lose its Equilibrium by some great weight apply'd to one of its sides, appears plainly in the following Scheme.

C 2

Wherein



Wherein the Point H represents the Center, the Line N S represents the Polar Axis or shortest Diameter of the Terraqueous Globe, N the North, and S the South Pole. E W the longest Diameter, E the East and W the West Points of the Oval NESW, that stands for the Sea or Watery mass, spread round about the sides of the Terrestrial Oblong Globe C D F G. Now it is plain, that if a great commotion, as an Earthquake, happens towards the Point W, and withal a considerable weight, as a great power of Rain, be added to that side, it will overballance the side E, and then the Water about W, not being able to be contained between W S N, must needs overflow towards I C L and M L C; and likewise the Water about E run over towards D O E and G O F, and thus drown the whole face of the Earth.

For

For be pleased to observe that I do not suppose that the Waters ran to the sides of the Earth, because there was a large Cavity prepared for them, but only because the sides were broader as they are in all Oblong Solides; and that the waters as a ponderous body tending towards the Center, and being hindered to penetrate into it in a direct line by the solidity of the Earthly Mass, they were forced to describe a parabolical one, in running towards the sides of the Terrestrial Oval, where they stop'd when they could descend no lower. It is true that at long run they might somewhat have depressed these sides, and digged a kind of Cavity: However I still conceive that the waters were higher than the ground about them, so that it was not very secure to live on the Sea Coast at that time, and it was an easie matter to drown the Earth again by making it lose its *Equilibrium*, and inclining it East or Westwards by a violent commotion, or a considerable weight added to one of its Poles. And that this was the constitution of the Primitive Earth appears farther by the solemn Promise God made to Mankind in the Person of *Noah*, never more to overflow the Earth, which was very necessary, supposing this facility of drowning it.

The supposition of the Center of the Earth being removed, does perfectly agree with my Hypothesis; for if the Center be removed in L, the Hemisphere I S M L will be greater, and consequently heavier than the Hemisphere I N M L: And therefore W will incline towards S, and E towards N, and the waters in W overflow the Earth in M, and the Waters in E the Earth in D. The same would happen if the Center were remov'd in O; so that the only difference between both Hypothesis, is that I suppose neither Miracle, nor any very extraordinary thing.

The overflowing of the Sea would, methinks, suffice to raise the Waters to the height of 15 Cubits; but that we may have no dispute concerning the height of the Mountains, I shall add another Supposition very conformable to *Moses's* Account, namely, his mentioning the *breaking up of the Fountains of the great Abyss*. It is incontestable that the Words used in the Original תהום רבה signify great Hollownesses and subterraneous Cavities. It is likewise undoubted that the Bowels of the Earth are full of Minerals, which being thrown out of their Receptacles by Earthquakes, and mixing with Water and other Liquors hidden in the Earth, cause them to ferment and boil: so that they, being dilated, and not able to be restrained within their former Limits, break open the Ground, and raise into Vapors, that are afterwards condensed into Rain; and as the sacred Writ joins the *breaking up of the Fountains of the great*
Deep

Deep with the opening of the Windows of Heaven; we may reasonably suppose that the first was the cause of the last, or the source and store of the forty days and forty nights Rain. Thus we need not to have recourse either to a miraculous Drought, or to the burning Comets.

So much will suffice I hope, as to the causes and manner of the Flood, I shall add but some few Periods concerning its effects. First, the Waters, and especially the salt Waters of the Sea, having rested upon the surface of the Earth about the space of a year; as they are slippery and creeping, and that this power was increased by the piercing and corrosive nature of the Salt, they still tending to the Center, as other ponderous things do, must needs have made great Holes in the surface of the Ground, where some part of them still remain'd as in their natural Channels, while the others were driven back to the sides of the Earth, and our Globe restored to its former *Equilibrium*. Thence it comes that it is now cut into so many Islands, and that there are so many Lakes, Streights and Arms of the Sea. 2^{dly}, By the same cause were brought forth many Hills, or the bulk of the former augmented. 3^{dly}, As to the wild Beasts that are found in Islands, whether to, 'tis not likely that they should have swum, or be carried by Men? I answer, That these places are become Islands, by other Inundations and Earthquakes, and that there are some, where no devouring Animals are to be found, as Doctor Ray relates. 4^{thly}, The most probable reason, to which the longævity of the *Antediluvian* Fathers may be ascribed, is the goodness of their Food; for I conceive that the primigenial Soil was impregnated with many fat and oily Particles, that turning into the juice of Plants and Fruits, made them an excellent and substantial nourishment. Besides, it may be collected out of these expressions of Moses, That God had not caused to rain upon the Earth, but that there went up a mist from the Earth, and watered the whole face of the ground, Gen. 2. 6. That before the Flood, the Terrestrial Globe was not subject to those many Tempests, excesses of Wind, Snow, Hail, Rain, and unconstancy of weather, to which it is now obnoxious. Add to this the long tarrying of the salt Water upon the ground, whose corrosive quality must needs have extremely altered the constitution and pores of the exterior Earth, and corrupted the seeds of Plants, and therefore God allowed Men after the Deluge, to feed upon the flesh of Beasts, as a more nourishing aliment than Fruits were at that time. 'Tis for the same Reason, that we see the life of Men shortning so fast after the Flood; for Noah that had used the best part of his life the substantial Food of the original Soil, lived

January, 1693.

15

lived 950 years, his Sons that were born an hundred years before the Deluge, remained about six Ages alive; but then each Generation had his life shortned of a whole Century, till at last the period of human life was fixed to a four, five, or six-score years.

And thus, Honourable Sir, you have my thoughts concerning the formation and drowning of the Earth, which I do not altogether look upon as a Romance, but should be unwilling to raise them higher than the probability of a Conjecture, and much less forcibly to impose them upon other Men, or to compose huge Volumes in their defence. Your Honour sees I have kept my word so far, as to suppose nothing contrary to Reason or Revelation, nor likewise to experience as much as this last was known to me; besides my *Hypothesis* supposes no unnecessary Miracles, to form Rivers, or to raise up Hills; no miraculous Providence to lengthen the days of the Creation, or to hasten the effects of natural Agents; no Angel to keep up the Ark, during the terrible Fall of the Ground into the Abyss, or to steer that Vessel amongst the ruines of the bursting and cracking Earth.

In a word, this *Hypothesis* does every way agree with the account of the Holy Writ, the only true Guide we have in this matter. For instance as to the going off of the Waters from the surface of the Earth, *Moses* assures us, that at the end of 150 days, *God made a wind to pass over the Earth, and the Waters were assuaged.* Supposing it to have been an East-wind, which God made use of to drain the Red Sea, and is also the most draining in this our Country; (any other may do as well) this wind driving the waters to the West, as it discharged the East-side, so it made the West more ponderous: so that the West-side by degrees overbalancing the East, the Terrestrial Globe returned insensibly to its former *Equilibrium* and Figure.

January 12.

LETTER

LETTER III.

To the Reverend Mr. M. A. D. B.

A R G U M E N T.

The Inconveniences that arise from confounding the Idea of Extension or Space with that of Matter; that Matter should then be independant, eternal and infinite, that Spirits and even God should be no-where. Motion demonstrated impossible in this Hypothesis. Reasons of the Cartesians examined. How Extension may be call'd the Essence of Matter, that Extension or Space is penetrable and indivisible? Whether Spirits are figured? Whether Substances penetrate one another? Of the possibility of Motion, the World being supposed full, but not infinite.

SIR,

(a) Works
of the
Learned.
Art. v.
(b) Ibid.
Art.
xxxvii.

YOU have too often told me, It was pity that my (a) Demonstration of the Existence of God, and my (b) Explication of the Mystery of the Holy Trinity, were ground'd upon such a weak foundation as the distinction between Space or Extension and Matter. You have provok'd me to set down in writing what Reasons I could gather for my Hypothesis, being confident that you shall solidly confute 'em, and make the Cartesian System triumph over the Epicurean, as you call it. Sir, since my present occasions engage me to the composing of these Memoirs, and that I have not as yet any thing wherewith to fill them, but what is my own or Translations, I am resolv'd to comply with you, hoping that it will succeed better than verbal Disputes, which would only tend to the diminution of that sincere friendship that has been hitherto between us.

It would not become us to accuse one another of Prejudice. I confess I have reason to be in love with an Hypothesis, which has helped me to the discovery of two such important Truths, as that the Idea of God is essential to, or innate in thinking Beings, and that the
Mystery

Mystery of the Holy Trinity is not altogether incomprehensible, but that we may, after the revelation of the Gospel, have as complete an *Idea* of it, as of any other of such divine Attributes, as immediately depend upon Infinity. You easily conceive of what usefulness this would be against the *Atheists* and *Socinians*, so that were it only for this reason, every good Christian ought to wish the Supposition were true.

I. The *Cartesians*, tho' never so ingenious, have not yet drawn such weighty Consequences from a Principle they have so long and so curiously wrought upon; but their Adversaries (c) are more successful; for they shew that all the Arguments *Des Cartes* or his Disciples have brought forth for the Existence of God, or the Immortality of the Soul, are either false, or grounded upon those Notions which they still hold in common with other Philosophers. Nay, it may be proved that this confusion of the *Idea's* of Space and Matter, directly leads to the grossest Atheism that can be imagin'd, in ascribing to dull Matter the most incommunicable Attributes of the Supreme Being, viz. Eternity, Infinity and Independance. This Proof runs thus: Objects or things are such as they are represented by their *Idea's*; for if Objects were not wholly like to their *Idea's*, we had no standing Rule to judge of 'em, and consequently we could know nothing certainly. But we have an *Idea* that cannot be annihilated, nor even supposed to be so, viz. that of Extension or Space, which is the same as Matter, according to you; for supposing all *Idea's* and Objects whatsoever, to be annihilated, besides me thinking, who could not otherwise make this Supposition; there remains still the *Idea* of Space inseparable from my thought; for then I shall think only upon an unlimited Extension. An Argument that has so puzzled one of the most skillful (d) Champions *Cartesianism* ever had, that he is forced to assert, that the *Idea* of Extension is essential to the Soul. But who has told him that this *Idea* is not also essential to Angels? I am sensible that it is a pure intellectual *Idea*, not to be annihilated by death; for if it were to be so, I do not know what should remain of me.

But to return to my Argument: That which cannot be annihilated, nor even supposed to be so, is independant; but the *Idea* of Extension, or Matter, according to you, cannot be annihilated, nor consequently Matter it self; for Objects are wholly like to their *Idea's*, and therefore Matter is independant. Moreover, that which is independant, is eternal; for if it had a Beginning, it should depend upon the first Author of its Being, and so could not be altogether

(c) Dr. More's Enchiridion Metaphysicum and Divine Dialogues. F. Daniel's Voyage into the world of Descartes.

(d) Regius.

gether independant; neither can we conceive that any thing that was not could bring it self into Being.

As to the intended infinity of Matter, it is not necessary to be proved; for infinity is really included in the *Idea* of Extension, wherewith they confound Matter, and the *Cartesians* have drawn themselves this Consequence from their Principle. At first their Master was asham'd to own it, and would only use the word *Indefinite*. But the most learned and sincere of his Disciples, as *Malebranche* and some Gentlemen of *Port-Royal* have ventur'd farther, and will plainly tell you, that the World is infinite, that Matter is infinitely divisible, that the smallest portion of Matter contains infinite Particles, &c. These Philosophers make nothing of infinite; for they are as lavish of them as a Poet, who is infinitely in love, adores an object infinitely charming, &c.

II. Indeed, Sir, you have there a fine System, and worthy that a Reverend Divine should stand for it, *tanquam pro aris & focis*, with as much Zeal as a true *Englishman* for the Protestant Religion, and the Liberties of his Country. I sincerely protest that were mine liable to one half of these inconveniencies, I would rather forsake all metaphysical speculations, than philosophize at such a dangerous rate. But what will you say to that other consequence, likewise confest by some of your Tribe, that Spirits, and even God himself, are no-where. One that should not be us'd to your Language would be apt to believe that you deny their Existence, for all mankind hitherto has look'd upon *not to be*, and *to be no-where*, as synonymous Phrases, and *Cartesianism* may well be of a Thousand years standing, and make far greater progresses than the *Peripatetick* Philosophy ever did, before it can root this notion out of the hearts of men. It's the common opinion, and the nearest, methinks, to the Truth, that spiritual Agents are not circumscribed in a certain place, for they have not, for ought we know, any determinate figure, and as they are penetrable, so they do not fill up a certain space, as do the solid particles of bodies. But your Gentlemen go farther, and as they are sensible, that if they grant that a Spirit is here or there, they must allow withal that it is extended some way or other, and thus bid the last welfare to their beloved notion of the identity of extension and matter, they rather chuse to say that it is no-where, not even in the center of its operation. But will one say, then it is not at all; no, answer they, it is, but it is in no place; for, add they, *place, space, body, extension and matter*, are all synonymous words. If

Peri-

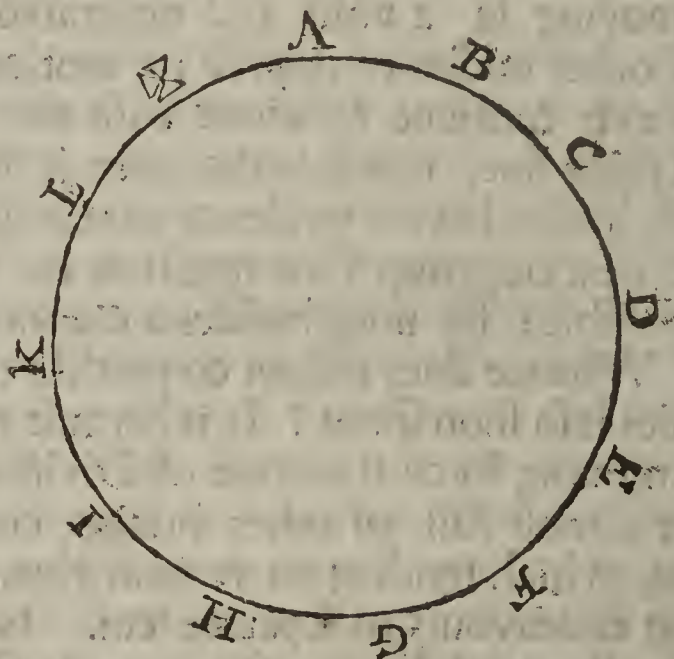
Peripateticism, so much laugh'd out of the doors, did ever assert a greater absurdity, I am content to turn a *Cartesian* myself.

III. You remember the pleasant device of that ancient Philosopher, who to elude the objection drawn from the impossibility of motion, if all be supposed full, began to walk into his School-hall: but the good man cut the Knot, which he could not unty. I do not know whether he held the world infinite; if not, he might have answer'd more rationally, as I shall do anon; but I defy any *Cartesian*, or whosoever maintains matter to be infinite, and to have been thus infinitely extended without any interstices from the beginning, fully to answer the following Argument. Matter is not only incapable of motion, as is confessed on both sides, but I observe farther that it actually resists motion. For let's suppose a small polish'd Globe moving in a void and unlimited space, where it should meet no other bodies to oppose its motion; we conceive that it would for ever continue to move with the same degree of motion, and in a right line, towards the place it had been at first directed; because bodies have a tendency to remain in the state they are in. It would be a begging of the question to alledge, that the supposition is impossible; for none besides a *Cartesian*, sees any impossibility in it. Whence does it then come that the moving force of terrestrial bodies is so soon spent? It is because motion is the beginning, and the moving force the cause of Division; and that this World is full, or almost full, of other bodies, compounded of divers solid particles, which tending to remain thus united, resist the moving body that endeavours to separate 'em. No wonder therefore, if Guns, the strongest Engine that men could invent, cannot carry a Bullet, the most proper body, to make its way through the resisting air, farther than a mile or two, since in that short space it meets with many millions of corpuscles, which oppose and deaden its motion.

If the Air, which we are apt to believe incapable of resistance, damps the moving force so quickly, what will Marble, and the least porous bodies do? for every one knows that the resistance to motion and division is proportionable to the various quantity of pores: so dry Wood is lighter and burns easier than green, Diamonds and Gold are harder and heavier than other Stones and Metals. This being supposed, if God created an infinite mass of Matter, he imprinted Motion to its parts, either at the very moment of its Creation, or afterwards. But that he did not imprint it at that very moment is plain, because then motion would be natural to matter, as it

is natural to men to think, to live, to grow and to dye; whereas motion is so far from being natural to matter, that it has a repugnancy to it, as has just now been observ'd.

Now I am to prove that matter being created infinite, God Almighty himself could not give it a motion. A very hard task, I confess, not so much in it self, as for the sake of some scrupulous people, who imagine that it is a detracting from the power of God to assert that he cannot do contradictory things, without considering that they are no things at all. For my part, I am perswaded that God can do whatsoever is consistent with his wisdom, holiness and other perfections; but a contradiction is a meer nothingness, because it affirms and denies the very same thing, at the same time and in the same respect, as I hope to make it out of the motion of an infinite matter.



Suppose ABCDEFGHIKL to be a Sphere infinitely extended every way; and an infinite power applying itself to A, or any other imaginable point of the unlimited circumference, if there may be such a thing in an infinite mass, in order to move A towards B, and so to divide the whole, I say it shall not compass its end, for while A moves with an infinite force towards B, B is repulsed with an equal infinite force by C, C by D, D by E, E by F, F by G, and so *in infinitum*: and therefore they must continue in the same State. As to moving the whole body of matter, besides the unprofitableness of that supposition, in order to the formation of the World, it is as impossible as the former; for as long as you suppose matter infinite, there is no room for it to move in.

By the Laws of disputation none is oblig'd to prove a negative; so that I have done more than you could reasonably expect, in raising such

such objections against your confounding the Idea's of extension and matter, that the last of 'em seems to me a demonstration I do not know how you can rid your self of these difficulties. However I am willing to examine what I have heard or read that is most probable for the assertion of your *Hypothesis*.

1. The Essence of things is taken to consist in the first general property that we conceive in them, but extension is the first general property that we conceive in bodies, and therefore extension is the essence of bodies. I answer, that extension or space absolutely taken, and in its most abstract and universal notion, is not the first general property of bodies; but that it is extension modified, extension limited and inseparably joyned with impenetrability and divisibility. So thinking may be called the essence of Spirits; however thinking in general is not the essence of men, but thinking modified a certain way, thinking by Idea's, form'd or excited by the senses and our Reflexions thereupon.

2. The Idea of extension includes impenetrability and divisibility, but these two last properties are the distinguishing characters of matter or bodies, whence it follows that all extension is impenetrable and divisible, and by consequence that extension and matter are one and the same. The first proposition is again equivocal: for absolute extension or space is penetrable and indivisible, and 'tis only extension modified, joyned and mixed with matter that is impenetrable and divisible. That extension in itself is penetrable, appears by that our Ideas represent infinite extension to us as incapable of being annihilated, independent and eternal, whereas we plainly see that each part of matter, and consequently the whole can be annihilated by an almighty power: for we easily conceive that God can annihilate all the bodies that fill up a certain space, as this Chamber; and to alledge that there should then remain no extension, and that the Walls should immediately touch one another, is a shameful begging of the question. We may imagin that some of the ambient corpuscles would penetrate through the pores of the Walls, as it happens in the Air-pump, or that finding no resistance from within they should break down the Walls, and dilate themselves in the void space; but if the Walls were suppos'd unmoveable, or so strong as to withstand the action of those impressing bodies, then the space should remain void of solid matter, and only be filled with a penetrable extension. It's known how much this Argument has puzzled the *Cartésians*, who have no other way to solve this difficulty, but by saying that their Adversaries argue from impossible suppositions. But let this supposition be what it will, my objection remains in its whole force, since

since infinite space having been prov'd independent and eternal, and matter annihilable and created, it plainly follows that the last was created within the space, or part of the space that was taken up by that infinite extension, and consequently that infinite extension is penetrable.

As to the indivisibility of the infinite space, it may be thus demonstrated. The moving force is the cause of division, and motion its beginning; but by the instance of a sphere infinitely extended in all its dimensions it appears, that an infinite extension is unmoveable, and by consequence indivisible. And lest you should object that I only argue *ad hominem*, or commit the same fault that I charge you with in confounding the notions of extension and matter; I pray you to observe, that I can also prove this indivisibility from the independency and eternity of infinite extension, and likewise from its simplicity; for we do not see why a most simple being, free from any heterogeneous bodies, from any mixture or composition whatsoever, should be divisible.

Notwithstanding you will urge that this is a meer Sophism, because we measure and really know the distance from one place to another, without taking notice of the interjacent bodies; and whether the interval is fill'd up with matter or not: that this is the ground-work of all the Mathematicks, of the most part of other Arts and Sciences, and even of common Conversation.

But, Sir, for all that, you have not gain'd the point: for 'tis compounded Matter, and not simple Extension, that we divide or measure. When we say, for instance, that *Rouen* lies 69 miles North-West of *Paris*, that is but a short way of speaking that serves our purposes as well, as if we had summ'd up all the most minute Corpuscles that are betwixt both Cities. And if you think well on't, you will quickly perceive, that were all these Corpuscles annihilated, you would come but very hard to the distant knowledge of that distance, for then you would be forc'd to fetch it from more remote bodies; and so bodies are still the measure of other bodies, and not extension of bodies or matter. I will not overthrow common language, but will not be seduced by it. It is necessary that we should make an imaginary division of the space or infinite extension, because we cannot comprehend infinity, nor exactly summ up all the small bodies that lye between two others. As in Geography to know the Longitude and Latitude, of the Climates and Seasons, of the Air and Soil of different places, we suppose several Circles in the Heavens, an Equator, a Zodiack, divers Meridians, five Zones, two Tropicks, two Polar Circles, &c. But was ever any Geographer so mad as to imagine that there are

are such Circles really in nature? And how can Philosophers conclude that extension is divisible, tho it be demonstrated to be most simple, only because the bodies contained in it are measurable one by another.

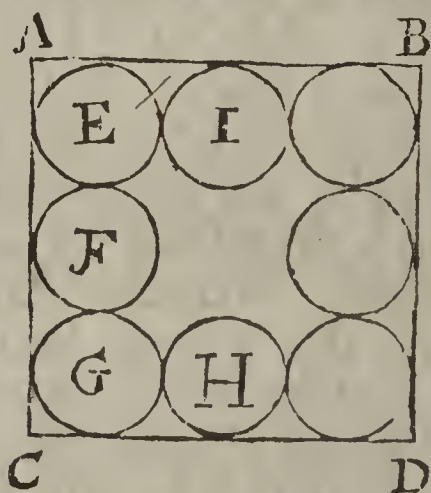
3. Now I come to the main pillar of your Hypothesis. Whatever is extended is figur'd, for it is terminated somewhere; but whatsoever is figured is material, then whatsoever is extended is material. The first proposition is utterly false, since infinite extension has no figure, being terminated no-where; neither do the imaginary divisions of the space give it any proper and real bounds, terms or figures, it being in it self indivisible, as it has been demonstrated. Thus falls by course your grand objection against the immateriality of Spirits, in our System. All that is somewhere, and may be said to be here and not there, is figured, for it's terminated; but according to us, Spirits are somewhere, for otherwise they would not be at all; then Spirits are figur'd, and consequently material. First, your objection does not reach the essence of God, which being infinite has neither bound nor end. Secondly, As to finite Spirits, their state is so far unknown to us, that we only know that they are thinking beings, that they are contain'd in the immensity of God, as all other things are; that God grants them sometimes the power of moving some parts of matter, more or less, as he thinks fit; but it does not follow that they are essentially united to the matter they move, no not our Soul to the Body it actuates; for it has no necessary dependance upon, but can subsist separated from the body. And tho Spirits might be said to be figured in a very improper sense, and in reference only to the matter they operate upon; yet it cannot be infer'd that they are really so, because they participate so far of the divine nature, as to be penetrable and indivisible, and cannot have therefore any proper figure. True it is, that upon the account of their limited essence we may say that they have something analogous to a figure, but what this is, is altogether unknown to us.

4. But you still urge that my Hypothesis includes the penetration of substances: Yes by all means, of substances of a different genus, as Spirits penetrate bodies, and bodies space. But that does not signify that an imaginary part of simple place or extension penetrates another, for simple extension is unmoveable and indivisible; nor that matter penetrates matter.

Last of all, you will say, that 'tis an easie thing to raise Objections against any hypothesis, but very difficult to propose one that shall be free from any great inconveniences. However I hope to do it; but such a performance requires a Letter longer than this. For a conclusion, I will shew you, as I promised, that the motion
of

See the fig.
of p. 5.

of the World may be explain'd, tho it be supposed full, provided it be not conceiv'd infinite : For if the Sphere A H D E be imagin'd finite, tho the whole mass be never so great ; notwithstanding, as there is no proportion betwixt finite and infinite, A moving with an infinite force towards B, and B resisting but with a finite force, must immediately push forth C, and C, D, and thus the whole mass be divided in a moment. The division being made, and the whole mass being separated into several particles, whereof some are extreamly thin, round, slippery and proper for motion, any part of the great mass may be mov'd, tho there be no void space left, provided a sufficient quantity of these particles continue in agitation.



For let the Square A B C D be the Lid of a Box, E F G H I a circle of round Musket-balls, the void space of the Lid and the interstices of the Balls be fill'd up with liquid and agitated matter, as are the corpuscles of the Air. As soon as you move E, it will communicate its motion to F, F to G, G to H, and so successively till it comes to I, which takes the place of E at the very instant that E moves from it. And thus you see the reason why I said in my demonstration of the Existence of God, that my hypothesis did not suppose the little void spaces of *Epicure* or *Gassendi*.

January 21.

LETTER IV.

ARGUMENT.

New Experiments on the Loadstone ; of a Needle touch'd with it, and plac'd directly over the Needle of a Compass ; of two Mariners Needles hang'd freely one over another, at several distances ; of a touch'd Steel-Ring. Reasons of these Experiments. The Earth Magnetical.

S I R,

I Thought to have sent you this time some excellent Observations concerning a prodigious Mushroom, out of the *Physical and Mathematical Memoirs*, together with an occasional Discourse of Mr. Tournefort, a Member of the *Royal Academy of Sciences*, about the generation of Plants, and their insensible Seeds ; but the Cuts, on which these Observations depend, not being ready, I was forc'd to wave it till another Month, and put in the place some new Experiments of Mr. *De la Hire* on the Loadstone *.

* Aug. 31.
1692.

Having divided the brass Circle of a Compass into 360 degrees, he put in a Mariner's Needle of 3 Inches and an half, which freely turn'd upon the Pin ; and he mov'd the Box, till the Needle stopp'd upon 360 degrees. Then having cover'd the Box with a Glass, he plac'd another Needle of the same length, and likewise touch'd with the Loadstone, upon the Glass, without any Pin ; so that the North Point of this Needle answer'd directly the North Point of the former, which playing freely in the Box, turn'd presently to the West, and after several Vibrations its North Point stopp'd 42 degrees West of the North Point of the uppermost Needle that was unhang'd.

Mr. *De la Hire* took notice that the declination of the hang'd Needle, rather to the West than to the East, proceeded from a particular cause, viz. that he had casually plac'd the North Point of the uppermost Needle about a degree more to the East than to the West

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of

of the Under-Needle. And therefore having taken off the uppermost Needle, and the other turning presently Eastwards, he put the second Needle upon the Glass again, and observ'd that the North Point of the Under-Needle after several Vibrations, none of which however reach'd so far as the North Point of the uppermost Needle, stop'd at last 41 degrees East of that Point, that is about the same distance as in the former Experiment.

Then removing the uppermost Needle again, and giving time to the other, to return as it did to 360 degrees, he put the second Needle upon the Glass, so that its North Point inclin'd to the West, and made a right Angle with the under Needle, whose North Point turn'd immediately toward the East and the South Point of the uppermost, so that when it rested, it was at 13 degrees from the 360, its natural place. In vain he labour'd to make the North Point of the under Needle pass to the West, for after many Vibrations, it still declin'd toward the East and the South Point of the uppermost Needle, keeping at the said distance of 13 degrees from its natural Position.

He therefore transpos'd the Points of the uppermost Needle, turning the North Eastwards, then the North Point of the under Needle declin'd towards the West and the South Point of the other, keeping still at 13 degrees from its natural Position, or 77 degrees from the South Point of the uppermost Needle: but when he brought this Point ten degrees nearer to the North Point of the under Needle, this North Point declin'd but five degrees nearer to the South Point of the other, so that both Points remain'd still 62 degrees distant one from another. But advancing the South Point of the uppermost Needle yet five degrees nearer, the North Point of the under Needle came quickly to join the South of the uppermost; so that the Points of different name lay directly one over another. And now the North, then the South Point of the under Needle beat against the Glass, as tho' it sought to unite it self with the opposite Point.

After these Experiments, Mr. *De la Hire* had a mind to try what effect these two Needles would have upon one another, if they were both free; in order to which, he put the uppermost Needle upon a Pin directly over that of the Needle included in the Compass, and at ten lines distance one from another: But what motion soever he could give to these Needles, their North Points turn'd still to the North; however so, that they remov'd 46 degrees one from another, one Eastwards, and the other Westwards, according as they were determin'd by the motion he had given them: Each Needle
being

being equally distant from the 360th degree. The same happen'd when he put the uppermost Needle upon a very low Pin, so that it was but at four lines distance from the under Needle, the Glas being between both. Only with this Exception, that when he placed the South Point of the one upon the North Point of the other, after some Vibrations, they remain'd thus united. Whence he draws this vulgar Inference, that the nearer the Needles are, the greater is their working one upon another.

This Author has propos'd some years ago, a new way to make a Mariner's Compass with a Steel Ring touch'd with the Loadstone. This Ring he put upon the higher Pin ten lines above the under Needle, and observ'd that at such a distance this Ring had as much and more power than the uppermost Needle, when he plac'd it but at three or four lines from the under; for being in motion they did not stop, till the Poles of different name in the Ring and the Needle were join'd together, or directly opposite one to another.

These Experiments partly agree with that vulgar and well-known Property of the Loadstones, that their Poles of the same name drive away, or remove one from another, as far as they can. Thence it comes, that two Loadstones that are free, or two Mariners Needles that are hanged one over another, move so long till their Poles or Points of different Name the North and the South, be directly opposite; the Diameter of the Circle they describe in their removing, being the greatest distance they can be at.

This, however, seems to be contradicted by one of the foregoing Experiments, wherein the North Points of two touch'd Needles freely and directly hang'd one over another, did only remove to the distance of 46 degrees, without joining together by their contrary Points. To explain this, Mr. *De la Hire* supposes that the mass of the Earth is a great Loadstone, which directs the Poles of the same name in all the Loadstones and touch'd Needles, towards the same place of the Earth; so that the two hang'd Needles do but remove from this natural Position by the particular force they have of driving away each others Poles of the same name; which force in a certain degree is not sufficient to overcome the power of the great Loadstone of the Earth. But if a foreign force remove these Needles so far, as to make their particular virtue superior to that of the earthly mass, then they will presently unite by their contrary Poles.

You may likewise have observ'd, that in the Experiments where one of the Needles was unhang'd, that which played freely in the Box remov'd but so far as to make with the other an Angle of 41 degrees, or thereabouts; whereas when they were both free, they

made an Angle of 46 degrees. This hapned because the unhang'd needle was turned to the North, whitherto the hang'd needle was also directed by the power of the earthly Loadstone, but driven from it by the particular virtue of the unhang'd needle; which however could not have so great a force as both needles together, when freely hang'd; for they then acting one against another, with an equal force, did more effectually overcome the power of the Loadstone of the Earth, and remove themselves at a greater distance.

This Hypothesis is confirmed by the experiment of the touch'd Steel-ring, which as it has more magnetical virtue in it than a Mariners needle, so the Poles of a contrary name, in the Ring and the Needle, did presently joyn together, that is, the North of the one, with the South of the other, in what situation soever they were placed.

Mr. *De la Hire* promises us some new experiments on the Loadstone with the reasons of it, which if they come to my hands, I will not fail to send you.

January 20.

LETTER V.

ARGUMENT.

Two Opinions about Petrification; that both may have place in different cases: This evidenc'd in several instances of pretended Petrifications. Of two pieces of the Trunk of a Palm-tree supposed to be turn'd into Stones: Whether they were really so? The causes of Petrification by Water.

S I R,

IN your Cabinet of Rarities, you have several of those curious Stones, which are said to be petrify'd Wood, but you give little credit to this relation, and rather take it for a *play* of Nature: Who among the various forms it gives to these hard substances, seems
som e-

January, 169²₃.

29

sometimes to take a pleasure in framing them in the likeness of the trunk or the branches of a Tree.

You are confirm'd in this opinion by the uncertain account Geographers give of some Fountains, and other Waters, to which they ascribe this vertue of petrification. They talk of a Pond near *Armagh* in *Ireland*, where if you stick in a Spear, that part which is fasten'd to the Mud shall be all Iron, that which is wash'd over with the Water shall be chang'd into a Whetstone, and that which is out of it shall remain Wood. In the Northern part of the same Province of *Ulster* is, say they, a Fountain, which turns Wood into Stones; but seven years are requir'd to finish this transmutation. At *Loches* in *Touraine* is a Spring that petrifies whatsoever is thrown into it: and at *Sens* in *Champaign* runs a source near a Lake, whose Waters harden into Stones. But as you doubt of the marvels of those *Irish* Waters, so I am not certain of the transforming vertue of these *French* Fountains, having never read of it in any credible Author besides *Varenius*, whom I esteem more for his easie method and Geometrical order, than for any matters of fact that he relates.

If we had no other Authors to trust to in this matter, your doubts would not be ill grounded; but that curious observer of Nature, the late Honourable *Robert Boyle*, has given so many instances of Wood petrify'd by Water, in his *History of firmness and fluidity*, that the matter of fact can hardly be doubted.

The Ingenious *Dr. Grew*, in his description of the Rarities of *Gredsham* Colledge, gives an account of several petrify'd Plants, and also of Stones like to them. For as he writes without prejudice on either side, it appears by his discourse that some of those Stones that are suppos'd to be petrify'd Plants, are Stones originally, in which Nature seems, as it were, to imitate the figure of these Plants. The same Judgment *Mr. Lister* makes of some Stones found in our *English* Quarries, that are taken for petrify'd Shells, *Phil. Transf. N. 16. p 282*. You will find in the *Philosophical Transactions* instances of Stones form'd in the bodies of Animals, and even of the *Glandula Pincalis* petrify'd in the brain of a man, that liv'd yet several years after; of Trees petrify'd in a Sandy ground; of Ashes of dead bodies transmuted into Stones in a Sepulchre; and I am credibly informed that near *Bungey* in *Norfolk* there is a Well endow'd with this vertue of petrification; for a Gentleman of our acquaintance saw some Sticks in it half Wood and half Stone.

But be it how it will, *Mr. de la Hire*, one of the most famous of the *French Academy of Sciences*, has thought fit to take the affirmative, or to assert the reality of this petrification by the occult qualities of

* p. mibi.
270.

Phys. & Math. Memoirs, July
some 31, 1692.

some Waters. It was on this occasion: The Abbot of *Louvois* presented to the *Royal Academy*, two pieces of a Palm-tree turn'd into Stones as he supposes; and withal two others of a real Palm-tree, very like to these Stones; that by comparing them together, it might be discover'd whether these Stones had formerly been real Wood, whose nature had been thus transmuted.

He was told that both the Stones and the Wood were brought thither from *Africa*. As to the Stones, none can doubt but that they are real, for they are as hard as Marble; their colour is dark in some places and transparent in others, their sound clear and piercing, and their gravity surpasses ten times that of the two bits of the true Palm-tree. To which he adds, that for the rest, these Flints are, so very like to those pieces of Wood, that it is altogether improbable that meer chance should have form'd two bodies so resembling one another.

One of these Flints, which he takes for part of the trunk of a Palm-tree, whose rind had been torn off, has 4 or 5 Inches diameter, and about two foot in length. There this quick-sighted Gentleman could distinctly perceive the fibres of the Wood, $\frac{2}{3}$ of a line thick, and some of them forked: all reaching along the trunk, and hollow within as a pipe; which he supposes to come from that the tender marrow, if I may so call it, that joyn'd those fibres together, was chang'd into a kind of very hard glue.

This he confirms by the following observation. That when long and soft bodies, but somewhat heavy, come to dry, the exterior part hardening by little and little, makes a kind of a vault round about them: Whereas the inward part, that is lesser, draws by degrees from the center to the circumference, and sticks at last to the outside; so that when the whole matter is harden'd, there must needs remain an hollowness, in and along the dry'd bodies, which have then the form of Pipes. As it is by this mechanisim that most of the marrow-plants, and the biggest sprouts of some Trees become concave, so the Author conjectures that the fibres of his pretended Palm-tree have been thus excavated.

After all, he confesses, that since the trunk of a Palm-tree is only made up of direct fibres, it may be doubted, says he, tho with little reason, whether chance has not framed the first Flint, which he has just now described, in the likeness of that trunk; but as to the second Flint, representing the bottom of the trunk of a Palm-tree, he thinks it inconceivable, that that should have been thus casually shaped: which he endeavors to prove in the following manner.

The

The piece of true wood, represented by the second Flint, is not only made up of right fibres as the former, but from its Bark sprout Roots, thick as the little finger, about 3 inches in length, and covered with a thin skin, that includes a great many small fibres as fine as a hair. In the middle of the little fibres, that make up the body of each root, is a woody string, that may be called its kernel, which is of the thickness of a third of the little finger, hollow and full of soft marrow.

Now he pretends that all these different parts are plainly to be seen in the second Flint, that besides the long and right *fibres* that make up its body, the roots, which for the most part appear as separated from one another, may be easily distinguished; that the small *fibres* of each root have been turn'd into a blackish and shining Flint, but the kernel into a whitish and dark; and that the marrow wherewith it was fill'd before its petrification being dry'd up, this kernel remained empty and hollow as a Pipe in most of the roots; which hollow-ness he ascribes to the same cause that had excavated the supposed *fibres* of the former Flint.

This Description seems pretty accurate, the resemblance very great, and the observations ingenious, but when all is done, 'tis pity that he who brought both the Stones and the pieces of Palm-tree, from *Africa* into *France*, was no Philosopher, and has given us no account of the place he found them in, whether in a River, or on the dry ground, as also of the constitution of the Climate and Soil round about it: for till then I do not see that we are sufficiently enabled to decide the grand question, Whether this likeness is an imitation or a transformation of Nature?

Our Author however thinks to have found an incontestable Proof of his Opinion in a Passage that he quotes out of the *Physical and Mathematical Observations* of F. du Chatz, where he says, "That the River that goes through the Town of *Bakan*, in the Kingdom of *Ava*, has in this place the virtue of petrifying Wood during ten Leagues; that he has seen there considerable Trees, petrify'd to the very surface of the Water, whereof the rest was but dry Wood; and that this petrify'd Wood was as hard as a Flint.

Both F. du Chatz, and Mr. De la Hire would have oblig'd us, had they taught us the nature of this River Water, which, if what is related be true, must undoubtedly be mineral: for so far I conceive this transmutation possible, viz. that Wood being soft and porous, and the Corpuscles of Minerals, as Vitriol, Marcassites, and the like, hard and piercing, creep into the Pores and inward part of the Wood,

Wood, expel its softer Particles, that become more and more agitated and liquid by the motion of the Water, and squeezing the hardest and remaining Particles of the Wood, form at last together a stony substance. The same may be said of such Fountains to which is ascrib'd the virtue of turning Wood into Iron or Copper. Thence also follow, that the more the Water is impregnated with mineral Corpuscles, the sooner the Transmutation is perform'd.

But the accurate Comparison Mr. *De la Hire* makes, between his two Stones and the two pieces of the trunk of a Palm-Tree, would rather persuade me that they are Stones originally, than Wood transmuted; for such a Transmutation ordinarily hapning by the expulsion or evaporation of the softest Particles of the Wood, and the accession of harder Corpuscles, as those of Minerals are; it seems that this permutation should make so great a change in the constitution of the Wood, that it would retain but very little of its former figure.

That this Transmutation is made by the Minerals that are mix'd with the petrifying Waters, appears by an Instance we have in *Darbyshire*, where Water falling along the inward side of a deep Cavern, petrifies before it be at the bottom. I say, that it petrifies, and not that it freezes; for tho' Cold may help to the condensation of the mineral Particles, yet it cannot turn the Aqueous into Stones.

January 31:

F I N I S.

MEMOIRS

FOR THE

INGENIOUS.

CONTAINING

Several Curious Observations in *Philosophy, Mathematicks, Physick, History, Philology, and other Arts and Sciences.*

IN

Miscellaneous Letters.

By *J. DE LA CROSE, E.A.P.*

FEBRUARY, 1693.

To be continued Monthly.

VOL. I.

Nil admirari propè res est una, Numici,

Solaque quæ possit facere & servare Beatum.

Hor. l. 1. Ep. 6.

— Dixere Deum namque ire per omnes

Terrasque tractusque Maris, cælumque profundum,

Hincque sibi tennes nascentem arcessere vitas.

Virg. Georg. l. 4.

LONDON, Printed for *W. Rhodes* near *Bride-lane* in *Fleet-street*;
And for *A. Harris* at the *Harrow* in the *Poultry*. 1693.

Where are to be had the *Memoirs* for *January*.

ADVERTISEMENT.

THe Title of these Memoirs was at first design'd with the word History, as it was printed in the Gazette, and as it is now at the beginning of this Month.

This carelessness has made me oversee the last Month as exactly as I could, in which I have observ'd some negligences of style, and some Print-faults, which the Reader is intreated to correct thus :

Page 9. line 10. Eclipsis read Elipsis. l. 33. beds r. Channels. p. 10. l. 19. this r. his. l. 28. remembers r. mentions. p. 13. l. 15. poles r. sides. l. 27. Hypothesis r. Hypotheses. p. 15. the last Paragraph beginning In a word, must be read before the first, beginning, And thus. p. 22. l. 40. of the Climates r. the diversity of the Climates. p. 24 l. 2. A H D E r. A B C D E. &c. in the Margin, p. 5. r. p. 20. p. 30. l. 4. r. 10. these Stones, these words being slip't out in some Copies.

I hope that this month is more correct, and that the following will be so.

Nuper Tarpeio quæ sedit culmine cornix
Est bene non potuit dicere, dixit erit.

I would have continu'd my Observations on the Original of Springs, but that I have past my word to that Gentleman, who has undertaken to write a General History of Fountains, not to meddle with this matter within two months.

I likewise forgot to set down a Table of the Letters of the last month, which I therefore joyn here to those of this.

Letter I. Of the Original of Springs.	p. 1
Letter II. Of the formation and drowning of the Earth.	8
Letter III. Concerning Extension and Matter.	16
Letter IV. New Experiments on the Loadstone.	25
Letter V. Of Petrification.	28
Letter VI. An account of a strange Phænomenon, of a Man tracing out Murderers by their footsteps, with Physical observations on it.	33
Letter VII. Of a Dead Body appearing fresh and flourid a considerable time.	44
Letter VIII. Whether the Mystery of the H. Trinity has been openly taught during the three first Centuries ?	46
Letter IX. Of the Preservation of Fruits.	53
Letter X. Continuation of the third Letter, of Innate Idea's, Infinity, Space, &c.	57

Memoirs for the Ingenious.

FEBRUARY, 1693.

LETTER VI.

ARGUMENT.

All that seems incredible is not so. Of a man tracing out Murtherers by their footsteps. Attestation of the matter of fact. An Historical Account of it. Its Possibility. Suppositions to explain this Phænomenon. The Nature and Conformation of the Particles of the Air, of the Effluvioms of living Bodies, of their several Qualities, of the force of Poysons, of the Variety of Pores. That these Effluvioms are not easily carried away by the Wind. Application of these Principles. Objections and Questions answered.

S I R,

INcredulity in matters of fact is a piece of Prudence, when they are related by anonymous Authors, who chiefly aim at promoting the Sale of their Books, or gaining the admiration of the vulgar by surprizing stories: but how astonishing soever a relation may be, if it be confirmed by several hands, and especially by learned men, and Eye-witnesses we ought rather to confess our Ignorance, or at least to suspend our judgment, than to reject it upon a pretended impossibility.

I heard some months ago of a Murther discovered in France by a divining Wand, however I did not then take notice of it, lest the thing not proving true, or being ill reported, I should expose both Philosophy and the Philosopher to derision. But having since learned all the circumstances of that prodigious discovery, not by hear-
F say,

say, but as they have been inquired into and set down by persons who cannot be suspected of credulity, as the *French* King's Attorney, the Lieutenant Criminal and other Magistrates of *Lyons*, and the Colledge of Physicians of the same City, by the order and special directions of Monsieur *D'Acquin*, first Physician to that Monarch: so great and so many testimonies, not leaving any room for doubt or suspension; I applied my self wholly to find out the cause of that wonderful *Phænomenon*, wherein I think to have been so successful, that the suppositions I make contain nothing but what's agreeable to the true notions of natural Philosophy.

I must needs premise a short historical account of the whole matter; First, because it is necessary to understand my System; and secondly, because, tho you may have heard of this History, yet I am apt to think that it is in a very confused manner, and with such circumstances as render the relation incredible. As for instance, they ascribe the discovery to the turning of the Wand; whereas the principal cause is the internal motion or disturbance of the Discoverer; this turning being but an outward sign and consequence of it.

On the 5th of July, 1692. three Robbers of *Toulon* in *Provence*, the one called *Thomas*, a Seaman, the 2^d *Andrew Pese*, a Fencer, and the 3^d *Joseph Arnoul* a Taylor, went to the house of a Wine-Cooper of *Lyons*, and, under pretence of buying Wine, brought both the Merchant and his Wife into the Cellar, where they murdered them with a Sickle, while they were drawing the Wine into a large bottle. This done they went up to a Chamber, which served both for a Shop and lodging Room to the murdered; broke open their Trunk, and took away 130 Crowns, 8 Louis d'ors, and a silver Girdle, and then made their escape without being perceived by any one.

A Neighbor of the murdered, hearing that one *James Aymar Ternay* of *S. Veran*, near *S. Marcellin* in *Dauphine*, was noted for hunting out Robbers and Murtherers by their footsteps, caused him to come to *Lyons*, where this Countryman, having promised to find out the Assassins, provided he begun his search at the place where the fact had been committed; was by the Lieutenant Criminal's, and King's Attorney's order brought into the Cellar; where he was no sooner entred, but he felt a strange commotion, his pulse rising as in a violent Fever, and the Wand he holds, when he uses to search the Springs of Fountains, or hidden Boundaries and Treasures, turning quickly in his hands, especially upon the place where the bodies of the Husband and his Wife were fallen down.

Thence

Thence he went up to the Shop, where the Robbery had been committed, and successively into all the streets and places through which the Murtherers had passed, till he went out of the City by the bridge of the *Rhone*, being accompanied with three men, that were admiring Spectators of all his doings. Sometimes he was sensible that there were two Accomplices, and sometimes that there were three. But his doubts were soon cleared, when still following his interior motions, he stop'd at a Gardeners house, where he affirmed that they had encompassed a Table, and handled a Bottle, amongst two others, upon which his Wand turned. Two Boys, who at first denied it, out of fear of being beaten, for having left the door open against their Father's orders, at last confessed that three men, whom they described, had crept into the house and drunk the Wine of the same Bottle, which our Countryman shewed.

Pursuing his search, he went to the water-side, where the steps of the Assassins, printed on the Sand, were a certain sign that they had taken Boat. He likewise followed them upon the River, and pointed at an Arch of the bridge of *Vienne*, which is not the usual passage; whence he infer'd, That they had no Waterman with them. During this Journey he caused his Boat to stop at all the landing places where the Murtherers had been a shoar, went directly to the Lodgings they took, shewed the Beds they lay in, the Table they sat at, and the Pots and Glasses they drunk out of.

Thus he came to a *French* Camp at *Sablon* in *Dauphine*, where being mightily disturbed, he perswaded himself he was in the presence of the Murtherers: but not daring to make use of his Wand to be convinced of it, lest the Soldiers should fall upon him, he returned to *Lyons* to beg a farther protection and assistance; he was sent back to the Camp with Letters of Recommendation; but before his coming, the Murtherers were gone to *Beaucaire* in *Languedoc*, drawn thither by the Fair, and the hope of a new Booty. However he followed them so far, going still to the places they had lodged at, and shewing the Beds, Tables and Vessels they had made use of.

While he was walking in *Beaucaire*, he stop'd at the door of a Prison, affirming that there was one of the Accomplices. Fourteen or Fifteen Prisoners were presented to him, among whom he marked out by the motion of his Wand, a crook'd-back Fellow, who an hour before had been taken for a small Theft, and was thereupon farther secured. Moreover he discovered, that the other two had taken the Road of *Nismes*. But he could not pursue them, both because he fell sick of the many disturbances he had lain under, and

that as the crook'd Fellow, who was that *Joseph Arnoul* the Taylor above mentioned, denied at first to have any knowledge of the Murther, and even ever to have been at *Lyons*; it was necessary that *Ternay* should go back with his Keepers, to confront him with his Landlords. By which it so plainly appeared that all what our Countryman had formerly told was true, that the wretched Taylor, not being able to deny it any longer, own'd the whole fact before the Judges, as it has been related, with this farther circumstance, That he kept the door, while his Accomplices were murdering the Man and his Wife. Hereupon he was sentenced to be broken up on the Wheel, and on his execution day, *August 30*, being made to pass before the murdered's door, he confessed of his own accord That he had been the principal cause of that Assassinate, by suggesting the Robbery.

Before his execution several experiments have been made, in the Cellar, upon the Prisoner, and upon the Sickle, which was the Instrument of the Murther. The Wand is motionless in most Peoples hands, it commonly turns more or less quickly in the hands of those, who have the gift of discovering Fountains, and all these are inwardly agitated; some faint away immediately, others feel the commotion an hour after, and its allayed by eating. Seven or eight persons have been found by these experiments to be endowed with this virtue of discovering Murthers, unknown to former Ages. The murdering Sickle has been put amongst others, and our Peasant blind-folded; however as soon as he touch'd it, his pulse rose, he grew pale and swet, and the Wand turned with extraordinary quickness. All these experiments have been made with the greatest caution imaginable, in presence of *Mr. Panthot* Dean of the Physicians of *Lyons*, *Mr. Chauvin* another learned Physician, the Lieutenant Criminal, the King's Attorney, and several Persons of Quality. So that the Magistrate being fully satisfied of the sincerity of this Countryman, sent him in search of the two other Murtherers; he pursued them to *Toulon*, and the utmost Havens of *France*, but all in vain, for they, having heard from the Jaylor of *Beaucair* of the taking up of the Taylor their Accomplice, were embarked for *Genoa*.

At first sight this history seems almost incredible, tho' attested by so many eye-witnesses, but all the pretended impossibility arises from not well considering the strong operation of insensible Corpuscles and *unheeded motion*, of which there are innumerable instances, as you may see in most of the writings of the modern Philosophers, and especially in a Book of the late Honorable *Robert Boyle* upon this matter; to which you may add, if you please, the following Observations.

1. *All the living bodies do continually transpire.* This is plain of some Plants, Flowers, Fruits, and Animals, by their sensible smell: but this transpiration may be prov'd general, by that in animals full grown, the quantity of the aliments they take compared to that of the gross excrements, of which they discharge themselves, is not as 3 or 4 to 1, nay in some as 7 or 8 to 1; so that 3, 4, 7 or 8 parts of our food are converted into blood, humors, vital spirits, &c. to supply the continual *effluvia* of our bodies.

2. *These Effluvia must needs consist in very small Particles.* First, Because they steam out of all the pores of living bodies, some of which are extremely narrow, especially in Winter's time. Secondly, because they transpire, after they have been subservient to the uses of these bodies, and become so extraordinary thin and weak by several filtrations, that being not fit any longer for the functions of Life, they are expelled by nature to make room for fresh Spirits. Thirdly, because they are continually exhaled, and in great quantities, for out of the bodies of a Partridge and a Hare, which do not eat $\frac{1}{4}$ or $\frac{1}{2}$ pound of seeds or grafs in a day, there transpire particles enough to direct a Setter, that smells and hunts them out by their footsteps.

3. *The Corpuscles or least Particles of the air of the Atmosphere are small blades, hard, smooth and flexible, rebounding as a Spring, and wrapt about themselves spirally, or obliquely, so that they represent the figure of a hollow Tube or Cylinder.* They are hard, for Air is not easily transmutated; they are smooth, for they do not hurt the bodies through which they pass; they are flexible, for you may bend them any way; they rebound as a Spring or as a Steel-bow; for tho' air may be reduced to so narrow a compass (as it is in Wind-guns) that it shall but fill the 2000th part of the space it takes up in its natural state; yet it cannot remain in that forced station, but endeavors with all its power to retake its own. Moreover the particles of the Air are hollow, for they contain many other corpuscles, as aethereal matter, vapors, exhalations of the Earth, Plants, and living Creatures. Besides, they are extraordinary light in comparison to other bodies; for to water they are as 800 to 1, which could not be if they were of a compact substance. Last of all, these particles or blades are spirally or obliquely rolled about themselves, in the form of a hollow Cylinder, for this figure is the most proper for condensation, since such Corpuscles can be squeez'd every way.

4. *The particles exhaling from living bodies may be said in general to be small, rigid, heavy, and viscus;* but as to their figure and particular qualities, they differ as much from one another, as do the bodies from which they steam out. Their smallness has been proved before, their hardness appears

appears in that their nature, cannot be easily changed: their weight follows from their hardness, and is evident besides, from that they do not rise a great way in the Air. As to their toughness, it cannot be denied by him who shall consider, that they stick at every thing they meet with. It's likewise incontestable that these steams partake of the nature of the bodies whence they exhale, for having made part of their substance, they are impregnated with their qualities, and being hard and clammy cannot easily be alter'd.

5. All this may be confirmed by a thousand experiments. For so Set-Hounds hunt out the several sorts of Dears and Game after a different way. And not only do these particles vary in the divers species of animals, but even in animals of the same kind, either naturally or accidentally. Thus a Dog that pursues a Stag, will not lose its strain, because another Stag has passed the same way; and a Spaniel, that goes back two or three miles to recover a thing which its Master has lost, cannot be directed but by the corpuscles that are exhaled from his body; nay the greater or less quantity of them makes a different impresson upon its smelling Nerves; for 'tis this difference, which determines it to stop at the place, where the thing has been lost, to smell it out, to take it up, and carry it back to its Master: and to ascribe this *sagacity* to any other cause, would be to make this beast incomparably acuter than the best Philosopher in the world, whom I defy to do the same.

We cannot deny the inexhaustible Riches of Nature's wise and omnipotent Author, when we consider the various conformation of sensible bodies; but as to insensible corpuscles, our senses being not able to perceive them, much less to be aware of any difference betwixt 'em, we hardly allow them existence when Reason compels us to it, and for the rest we suppose them as much alike as two drops of water. An error of great consequence in Physics, which however may be easily redressed by the help of a Microscope; for corns of Sand that appear so alike to the Eye, are perceived through a magnifying glass to differ from one another in bigness, figure and colour. Let it be then for the future a general Axiom, *to judge of the sameness or variety of insensible corpuscles, by their real effects, and not by the prejudice of senses.*

6. *As the constitution of living bodies changes by diseases, passions and other accidents, so do likewise the corpuscles exhaling from them.* The case is plain by the instance of contagious diseases; for the particles that steam out of the bodies of them who are tainted with it, infect the room and the beds they lye in, the linnen, cloaths and vessels they make use of. And as to passions, if we consider the sudden changes that

that fear, anger, hatred, and eagerness produce upon the faces of men; we will make no difficulty to believe that the corpuscles exhaling from them at that time, are impregnated in some degree with the same power and qualities.

7. *Of all the passions, anger or rage is the most dangerous, and often converts the corpuscles steaming out of irrag'd creatures into poison.* This is evident by the instances of a mad Dog, a straitened Cat, an angry Bee, &c. Nay, most of the venomous Creatures, as Scorpions, Snakes, Vipers, &c. do but sting, when they are incensed.

8. *The strongest poisons partake of the nature of leaven so far, that a very small quantity of 'em puts a huge lump into fermentation.* There are few but know, that an inconsiderable grain of Arsenic or Sublimate will kill the most vigorous man in the world. But I know an instance that comes nearer to the purpose, viz. to shew the strong working of corpuscles steaming out of living creatures, when they are irrag'd or distressed; and the truth of which I can testifie, as having happen'd to persons of my acquaintance. A Drugsters Prentice (a) of Grenoble (a) Roquet. having foolishly incens'd a Viper, was scratch'd by it on the forefinger, but so slightly that he was not aware of it. He continued all the afternoon to go about his business, without feeling the least pain or trouble in the world, went to supper, then to bed and fell asleep. But between twelve and one in the morning, he found himself so ill on a sudden, that he call'd for a Priest instead of a Physician, fearing that his last hour was come. He himself did not know the cause of his disease; but it was discover'd by an able Physician (b), (b) The who made him give an exact account of what he had done the former late Mr. day: And for a farther conviction he saw the gangrene on the Chalvet. scratch'd finger. To be short, the gangren'd finger was cut off, and the Patient rescued as from the clutches of death, by the use of the volatile Salt of Viper. Pray observe that these venomous particles had all the general properties, which I have ascribed to the steams of living bodies, viz. that they were *small, hard, weighty and clammy*. How small must they have been, since they penetrated through all the pores and fibres of that young mans body, by an insensible scratch? how hard, weighty and clammy, since their nature could not be alter'd by the whole mass of humours and blood, but that these few and small particles chang'd and corrupted the whole.

9. *The pores of different bodies are of a different figure, so that the one, are fitted for a sort of steams, and the others for another.* This Axiom needs no proof, but only to be well remembered; for it is the cause, that what works upon one man has no effect upon another, no, not upon the same man at several times. Thus during a contagion, some

who

who daily converse with those that have the Plague take no harm; whereas others are infected by those few small corpuscles, that are spread in the Air.

10. *The steams exhal'd out of living bodies are not easily carry'd away by the wind.* This is the chief *Theorem*, which if I prove, the whole matter will be clear'd. I have shew'd them to be small, hard, weighty and clammy; qualities which render them improper for motion. If it be objected that they swim in a fluid, whose determinations they are forc'd to follow: I answer, first, that all the corpuscles that make up the Atmosphere are not equally moveable: for the *Æthereal* matter moves very swiftly, and as in an instant, as appears by the impression of luminous objects: Whereas the gross particles of the air do not flow so quickly as a post-horse can ride; for in calm weather you may know that you outrun the air, by a small wind continually blowing on your face, which being not felt by others, cannot proceed but from the opposition the Air makes to your riding swifter than his ordinary course. Exhalations move yet slower than the Air, and it seems that the most violent Winds cannot blow them all away. For the Fermentations of the Earth, that are the store of these Exhalations, are made in the ground, which transpires but insensibly at certain times, and at others very abundantly; however the constitution or temperature of the Air of different places, save the variation that is produc'd by the four seasons of the year, is almost always the same; which could not be, if all the Exhalations were blown away by the first Wind that rises: for then the places whitherto these Exhalations should be blown, would take, at least for a certain time, the qualities of the place whence they flow: as it happens sometimes, tho very seldom, that by extraordinary Earthquakes, Fermentations and Winds, some places become healthful or unwholsom, all the former Exhalations being dissipated and succeeded by contrary ones.

Secondly, what Hypothesis soever you chuse for the formation of Winds, my corpuscles are so small, hard and heavy, that they will not be hurt by them. For whether they proceed from the heat of the Sun, or from Fermentations rarefying the Air, or from Vapors and Clouds breaking into it; the Winds still begin in a dilated place of the Atmosphere: so that this air spreading round about, or tending to a certain point whitherto it's determined, and the neighboring air which is driven from its place, ebbing to that where the rarefaction has been made; in that mutual conflict, the particles of the air which contain the small and hard effluvioms, will remain unmoved, as a Ship beaten by two contrary winds, will neither go forward

forward nor backwards. However, I will not infer, that they are absolutely unmoveable : it suffices, for my purpose, at present, that they cannot easily be blown away. For the hunting out of the Murtherers, was begun soon after they had committed the Fact; and the Discoverer was directed in his pursuit, by the Corpuscles that continued to steam out of their bodies.

It's so easy to apply these principles to the matter in hand, that I would not trouble you or my self any farther about it, were it not yet necessary to answer some questions by the way. Our Countryman felt an extraordinary commotion as soon as he entred the Cellar, especially when he came upon the place, where the two murdered bodies had fall'n, his Pulse rose, he swet, he grew pale, he fell into a swoon, his Wand turned swiftly; because these effluvi-ums are acute, hard and venemous corpuscles, which putting him into Convulsion-fits, contract the bending muscles of his fingers, and consequently make the Wand he holds fast in his hands to turn. For there is no mystery in this Wand, it being but a forked stick, cut at any time from any Tree, and which any one may give him if he please, so that it serves only as an outward sign to show that he is on the footsteps of the Murtherers. This experiment being repeated, a fortnight or three weeks after, the same effect almost was produced, but differently upon several persons, according to the difference of their pores and constitution. The reason of it is, that the air of a Cellar having little communication with that of the Atmosphere, the *Effluvi-ums* could not be so soon dispersed. Our Discoverer followed the Assassins upon the *Rhone*; because these steams being small, rigid and ponderous, some of 'em were entred into the particles of the Air, and had stopped their course for a while: He pointed at an Arch of the Bridge of *Vienne*, under which they had passed; because they being clammy, some of them had stuck at the walls of the Arch. By the same means he is able to show the Tables, Beds, and Vessels they have made use of.

He is not so much troubled when he follows them upon the water, as when he pursues them upon the land; because in the first case, the effluvi-ums which fall down are carried away by the course of the River: Whereas in the second they remain upon the ground, and are drawn up by the Sun or Wind, to supply the place of those that have been dispersed by the motion of the Air. And accordingly, when the crook'd-back Taylor was brought to *Lyons*, it was observed, that our Countryman could not go after him, but was forced to walk a great way before, to avoid the vexation that the effluvi-ums of this Murtherer put him into. In short, the most sur-

prizing circumstance of this relation is, that this Countryman hath the courage willingly to expose himself to such continual troubles, in order to hunt out this sort of Rogues; for he must be either very charitable, or have a great reward promised him.

But if these corpuscles are a kind of poyson to him, why do they not affect other People? because the pores of their bodies are not fitted to receive them, or because they can but work upon a certain sort of matter, which is not to be found in others; just as the effluvia of the Small Pox do infect such as never had them, but not those that have been thoroughly purg'd of that venom. Were I acquainted with the man, and had I had occasion to examine his constitution, perhaps I could tell you more particulars. But all that I know of him is, that he was born on the 8th of *September*, 1662. between twelve and one in the morning; That he has the reputation of a good sober man, and that his Brother born two years after in the same month, has not the same property.

You still urge, That it is inconceivable how some few small effluvia spread through the open Air, should so wonderfully direct that man in his pursuit. I might mention again the prodigious operations of contagious steams and venomous corpuscles, which I have already alledged: I might add to it that of the Loadstone, whose effluvia passing through the brain of a man are yet strong enough to move a touched Needle: For put a Loadstone at one of your Ears, and a Mariners Compass at the other, observe the degree upon which the Needle stands, and place the Stone and the Needle so, that their Poles of the same name answer to one another, and a third person looking on the Compass may observe, either that the Poles of the Needle do altogether change, or that they decline above 40 degrees.

But I have yet a more pregnant instance. Undoubtedly, you have been sick, or at least conversant with sick men, and therefore you may have observed that an inconsiderable smell or noise, of which they would not be sensible in health, affects them very much during their disease. The complaints they make of it do not proceed from moroseness, but from a most unwilling and sensible vexation, as I can testify by my own experience. Now as the particles that produce smells and sounds trouble a sick man, because his Organs are weakened by his Disease: so, the few effluvia that remain on the footsteps of the Murtherers, continue to disturb our Countryman, because of the violent commotion his Spirits have been put in at the place of the Murther.

2. As to your question, whether he can smell out Duellists, Incendiaries, Adulterers, Perjurers, and other notorious Criminals? I answer, that my Memoirs go not so far, they tell me only of his discovering boundaries of Land, Silver and Gold hidden in the ground, which, you cannot deny, emit effluvia; as appears by the *Antimonial* Cups, that will for a year, or longer, communicate an Emetic vertue to the Wine that infuses in them one night.

3. I shall finish with a hearty wish, That such Discoverers may become more common, or that their Talent may be known, and improved, if they are already in being. Would to God we had a hundred People in *London*, that could hunt out not only Robbers and Murtherers, but also all sorts of Cheats and Rogues: and that they were allowed so much for every one that should be apprehended and convicted by their means. It would be a ready way to reform this great City, which however considering its bigness, is not near so much corrupted, as many other I could name. A blessing that cannot be ascribed but to the public Profession of the Protestant Religion, as may be easily made out.

February, 6.

LETTER VII.

*To the Honoured Dr. Garth, one of the
Colledge of Physicians in London.*

ARGUMENT.

*Of a Dead Body not growing stiff, nor putrefying in Three Weeks
time.*

Honoured Sir,

SINCE I have undertook to entertain the World with surprizing relations, I shall add here another, that I have from good hands; for tho it be not so incredible as the former, yet it's so unnommon, as to deserve physical observations; and it being somewhat out of my sphere, I shall take the liberty of asking your opinion concerning it.

Claude Mairai, a French Souldier, having broke one of his Legs in leaping over a Ditch, two or three miles from *Tournay*, was brought into an Hospital of that City, and some days after seiz'd with a Bloody Flux, which tormented him so, that having left him nothing but skin and bones, at last it killed him, *November 9. 1692*, being 23 years of age. His dead body was put among others to be interr'd, but the burier did not take it up, because it appear'd as tho it had not been dead, having a chearful countenance, a florid colour, flexible limbs, and no ill scent at all. As it continued so, for several days, they put it in a Coffin, wrapt up in a white Linnen cloath, leaving the face and feet uncover'd, so that it might be seen by the curious, who resorted thither in great numbers. It remained in that state, without any considerable change, till the 29th of *November*, that it was buried, in a Lead Coffin, with his name engraven

engraven upon it, by order of the Archbishop of *Cambray* Nay this Prelate and the Intendant thought it worth their while to cause, each on his side, a verbal process to be made of this accident, both to clear the matter of fact, and to preserve the memory of it.

Dr. Garth's Answer,

Reverend Sir,

I Do not much wonder that the dead body should continue so many days without any offensive smell; because the dysentery prevailing so long, must without doubt so far promote evacuation, as to reduce the body to that emaciated state you speak off; not only the sulphureous parts of the blood, which in their own nature are inclinable to putrifie must be thrown off, but also all the other fluid and unctuous humors whatsoever. Besides, I my self have seen the treatment of a Person sick of this distemper at the *Hotel Dieu* at *Paris*, and I remember the Medicines the Physicians insisted upon, were the Powder of Myrrhe given several times a day, and also Turpentine Clysters, which were frequently injected, and in a great quantity. Monsieur *Moraine* told me at the same time, 'twas a method generally used in their Camp-Hospitals; now 'tis well known of how much use Myrrh and Turpentine are to preserve dead bodies from putrefaction; considering also the penetrating quality of the latter, and its capacity of diffusing it self so effectually. As to that unusual plyableness of the Limbs you write of; 'tis certainly the animal Spirits which, by their constant irradiation of the Nerves, keep the body in an easy hability and compliance: And tho after death there can be no animal Spirits, yet there may be such an intestine struggle from differing particles acting upon one another, as may continue that fermentation tho faintly, which at first was vigorous, and the occasion of the dysentery. Thus we see an acide Spirit poured upon Steel, will communicate a heat to the Vessel that contains them both, some considerable time after the first tumultuous boyling seems to be composed. But how far this insensible ebullition may promote a florid color, I will not undertake to determine, unless I were sure of the matter of fact.

Febr. 10.

LETTER VIII.

LETTER VIII.

To the Author of these Memoirs,

ARGUMENT.

The Subject of this Letter, Philological. A new Argument against the Socinians. A public and a private Instruction used in the Primitive Church. That the Mystery of the H. Trinity was not openly preached before the Unbaptized; and therefore the Creed and the New Testament not read before the Catechumens or Probationers. That several Dogmes were concealed from their Knowledge, as well as the Rites of the Sacraments. Who were the enlightned. Hebr. vi. 4, 5, 6. What gave the boldness to the Gnosticks of feigning Mysteries. The Original of Arianism, and of the Modern Heresies. Inferences from this. The Decisions of the Church ought to be reverenc'd. Short Reflections of the Author. An Invitation to the Learned to answer this Letter.

S I R,

HAVING observ'd that you are a zealous assertor of the Mystery of the H. Trinity, I make bold to send you my thoughts concerning the grand objection that the *Socinians* use to make against it.

We hold that this Mystery is the fundamental point of the Christian Religion, and that without the belief of it no Salvation can be had: But how should it be believed, say they, when it is not preached. The very name of *Trinity* is not to be found in the Books of the three first Ages of the Church, no more than that of *Consubstantial*: and as to the Doctrine it self, it is there so obscurely taught, or variously explain'd, that an unprejudic'd person will hardly

hardly conceive, that, by such general and imperfect notions, the vulgar Christians could frame to themselves a distinct and uniform Idea of that Mystery.

You know the use these men make of this, that the modestest amongst them talk of no less than rejecting this fundamental Article of Faith, as an unnecessary speculation. I hope that the following thoughts may solve this difficulty, and that you will not deny them a place in your *Memoirs*, since they concern one of the most important inquiries of Ecclesiastical History.

St. *Paul* testifies that the preaching of the Cross was an occasion of Scandal to the *Jews*, and appeared a Folly to the *Greeks*. This prejudice being one of the greatest hinderances to the propagation of Christianity, it was requisite that they should bethink themselves of a way to remove that obstacle. And therefore they used a different method in their Sermons according as they preached, either to the *Jews*, or to the *Gentiles*. To the first they proved, That *JESUS* was the promised *Messiah*, and consequently the Son of God, as they themselves confessed that the *Messiah* should be. But their mistake was, that they looked upon him as an Earthly King, sent from Heaven to conquer the World, and inflave the rest of Mankind, that the *Jewish* Nation might Lord it over them: Whereas he was only come to reform wicked men, to redeem their Souls, and to erect a Spiritual Kingdom. As to the Heathens, since *Polytheism* was their grossest error, the Apostles at first endeavour'd only to demonstrate to them, That there was but one God, who had made Heaven and Earth, that he fill'd the whole World; and that therefore it was absurd to adore so many Gods, or one and the same God under so many different forms, or to imagine his virtue to be included in Temples, Statues and Images.

You will see these two ways constantly followed; in the several discourses St. *Peter* and St. *Paul* made in the Synagogues of the *Jews*, or to the *Gentiles*, as at *Lystra* and *Athens*, *Act. xiv* and *xvii*. And this prudent conduct of the first Preachers of the Gospel cannot make them to be suspected of any prevarication, because they gave a fuller instruction to their new converts, when they saw them persuaded of those preliminary points, and in a fit state to receive Baptism: At which time they did not *shun to declare unto them all the Counsel of God. Act. xx. 27.*

St. *Ambrose* in his Commentaries on the 9th Chapter of St. *Luke*, having shown that St. *Paul* observed this method in his discourse before the *Arcopagites*, renders a very pertinent reason of it: *Qui enim tractat, debet audientium considerare personas, ne prius irrideatur quam audiat.*

audiat, &c. 'He that preaches ought to consider with whom he has to deal, lest he should be derided before he be fully heard. 'How should the *Athenians* have been perswaded to believe that the word was made Flesh, and that a Virgin had conceived by the H. Ghost, when they laughed at the Resurrection of the dead? How ever *Dionysius the Areopagite* believed, and others likewise believed in the man [CHRIST] that they might [afterwards] believe in God. For what matters it, in what order we believe? Perfection is not looked for at the beginning, but from the beginning [or principles] we come at last to be perfect. And therefore we must follow the same order in the information of the Heathens, which St. Paul followed in the instruction of the *Athenians*. But when the Apostles spoke to the *Jews*, they told 'em that he was the *Messiah* promised by the prophetic Oracles, tho they did not prove him by their own authority to be the Son of God, before they had demonstrated that he was a just and holy man and risen from the dead, that man of whom it's said, *Thou art my Son, this day have I begotten thee.*

But we have still a more pregnant testimony of the constant use of this method, in respect of the *Neophytes*, or beginners, and of perfect Christians. St. Paul makes the distinction himself, and marks the different ways he used toward them, when he says to the *Corin-*

(a) 1 Cor. 3. 1. 2. *thians, (a) I could not speak unto you, as unto Spiritual, but as unto Carnal, even as unto babes in Christ. I have fed you with milk, and not with meat: for hitherto ye were not able to bear it, neither yet now are ye able: for*

(b) Strom. l. 5 *ye are yet Carnal.* Whereupon *Clemens Alexandrinus* says, (b) 'He gives here a Caution, lest the words (or mysteries) should be made publick to the Vulgar... For when he asserts that milk belongs to Children, and that meat is the food of the perfect, he understands by milk the Catechism, which is as the first nourishment of the Soul, and by meat a sublime Contemplation, which is the very flesh and blood of the Word, that is an apprehension of the Divine power and essence: *Tast and see, says he, that Christ is the Lord.*

(c) Tom. 12. p. 292. *Origen* is of the same opinion in his Commentaries on St. Matthew (c) and St. John. (d) But the Anonymous Author of the Commentaries on

(d) Tom. 15. p. 225. *St. Paul's Epistles*, (who certainly liv'd in the fourth Age, tho' this work be none of St. Ambrose's to whom it is ascribed) speaks yet more to the purpose. *Quædam sunt Mystera Religionis nostræ, quæ propter carnales sensus, ne scandalum patiantur, facile publicari non debent, quia non omnibus dicenda sunt omnia, sed pro unius cujusque captu moderanda sunt dicta, aliter rudibus, aliter fundatis.* 'There are some Mysteries of

of our Religion, which ought not to be easily divulged, because of the carnal senses that may be put upon them, lest they give occasion of scandal: But our words ought to be proportioned to the capacity of each understanding, and proposed otherwise to the weak, than to those that are firm and well-grounded in the truth.

Sozomen in the first Book of his Ecclesiastical History, Ch. 19. gives this reason of his omitting the Nicene Creed, that it was probable that several, who were not INITIATED in the Holy Mysteries, might read his Book. And therefore Origen, making an enumeration of the Articles of the Creed that are conceal'd from none, mentions the Birth, Passion and Resurrection of our Saviour, our rising from the Dead, and the last Judgment; but passes by the Mystery of the Holy Trinity. To this may be referr'd this saying of St. Gregory Nazianzen (a), *They who esteem the Holy Ghost to be God, have a divine and enlightned mind; they who assert him to be so, if they speak to such as are of a sound judgment, are of sublime thoughts: but if their hearers be weak, they are not prudent dispensers of the truth, to cast pearls into the mud.* (a) Orat. 44. de Spir. Sancto.

By these and many other Passages that might be alledg'd, it's plain that this concealing of the most mysterious Doctrines of Christianity, was generally receiv'd in the Eastern and Western Churches: so far, that the youngest *Catechumens* were in many of them not allow'd to hear the reading of the Lord's Prayer and the Creed, nor of the Gospels and Epistles, but only of the Old Testament; much less were the *Jews* and *Heathens* admitted to it. And thence it is that the Catholick Church shew'd such a resentment against those, who by weakness, and for fear of the torments they were threatned with, had deliver'd the sacred Books into the hands of the Infidels, branding them with the infamous name of *Traditores*. Moreover, since it appears that this Discipline was firmly established, and receiv'd without any contradiction, through all the Christian World, in the third and fourth Centuries, if the Rule of St. Augustine (b) be true, *That whatsoever the Universal Church holds, that has not been instituted by any Council, but always retain'd and kept, may be justly esteem'd an Apostolical Tradition.* (b) De Bapt. l. 4. c. 24. We may reasonably conclude that this method of concealing the highest Mysteries of the Christian Religion, is deriv'd from the Apostles, and their first and chief Disciples; for those ancient Fathers were so nice in observing it, that when in their publick Sermons their Text led them to a more particular Explication of some of those secret Doctrines, they cut off the thread of their Discourse with an *ἵνα οἱ μεμυρημένοι*; *the Initiated understand me*, and so pass'd to another Head. Thence it was that the Baptiz'd,

and the *Competentes*, that is, such, who after a long and serious examination were admitted Candidates for Holy Baptism, and in order thereto receiv'd a more particular instruction, are called *γνώσικοι*, *knowing*, in opposition to the *Neophytes*, or Beginners.

But, lest you should answer, with some Protestant Divines. That this concealing concerned only the Rites and Ceremonies of the two Sacraments, Baptism, and the Lord's Supper; I shall add two Passages, which seem to decide the question. The first is of St. Basil (a); who plainly distinguishes between secret Doctrines, and those that might be made publick. *A Dogme*, says he, *is one thing; and Preaching is another; for Dogmes are to be kept private, and Preaching to be made publick.* The other, which is of St. Cyril of Jerusalem, is still more pregnant; for speaking of some Articles of the Creed (b), he says, "These Mysteries and Sacraments, the Church now reveals to those that have passed *Catechumens*, it being unusual to explain 'em to the Gentiles: For we do not declare to any Heathen the secret Mysteries of the Father, Son, and Holy Ghost: but we speak much and often in an obscure way, that the faithful, who know these things, may understand us; and those that are unacquainted with 'em, may not be hurt."

(a) Lib. de
Spir. Sanct.
c. 27.

(b) Catech.
Myst. 6.

This Circumspection of the primitive Church may be of great use to explain that famous Passage, *Hebr. vi. 4, 5, 6.* *It's impossible for those who were once enlightned, and have tasted of the heavenly gift; and were made partakers of the Holy Ghost, and have tasted the good Word of God, and the powers of the world to come: If they shall fall away, to renew them again unto repentance, seeing they crucify to themselves the Son of God afresh, and put him to open shame.* Pray observe the various degrees through which these Apostates had pass'd; they were once *φωτισθέντες*, *illuminati*, *enlightned*, this is the very name in Greek of the *Competentes*, or Candidates for Baptism. In that state they had tasted of the heavenly gift, *δοσάς τ' ἐπελάβη*, because the sublime and celestial Truths that were before conceal'd from them, began then to be imparted to them: nay, they had been deem'd worthy to be raised higher, and to be made partakers of the gifts of the Holy Ghost, by the Sacrament of Baptism, and the imposition of hands. Then it was that they relished the Word of God as the most substantial food of the Soul, *πλέον θεῶν πνίμα*, and the hope of a future life, as the greatest comfort of this. No wonder therefore if Men brought so hardly and slowly from so low a station to such a high degree of knowledge, if they come to apostatize, to forsake and betray the truth, to fall down on a sudden, *μεγαπείλιν*, no wonder, I say, if such Men cannot possibly be renew'd to Repentance, for their Apostasy must needs proceed from

as bottomless a malice, as that of the heads among the *Jewish* Priests and Pharisees, who crucify'd our Saviour, tho' they knew him to be the *Messiah*.

The easie Solution of all the *Phænomena* or dependences of a Subject, is a strong Proof of the truth of an Hypothesis in Historical, as well as in Philosophical Matters. Pray, what good account can you give of the birth of so many Heresies immediately after the death of the Apostles? for all the *Heresiarchs* were not so impudent as *Hymenæus* and *Philetus*, or *Simon the Magician*. *Valentin*, *Basilides*, *Carpocrates*, *Artemon*, *Marcion*, &c. boasted to be the true Disciples of the Apostles, who, as they pretended, had entrusted them with their most secret Doctrines. Had there been in the Peoples hands an Abridgment of the Christian Doctrine, so much as our Church-Catechism, or at least as the Creed ascrib'd to the Apostles. Had it been the universal Opinion that this short Instruction or Creed contain'd all the Articles necessary to salvation, and that Christ and his first Disciples had taught nothing but what was briefly comprehended in those Summaries, then it had been an easy task for the most vulgar Capacity to have convinced these Hereticks, by telling them, That since the Apostles had been altogether ignorant of these pretended Mysteries, they were but Madmens Dreams. On the contrary, it is hard to conceive how the *Valentinians*, *Basilidians*, and other *Gnostics*, should have made bold to vent their *Æones*, their *Abraxas*, and other impertinent Fancies, for Apostolical Traditions; had not the custom amongst the Orthodox of keeping their Mysteries secret, given an innocent occasion to that Imposture.

The Church was no sooner at peace, and the fear of the Heathens deriding our Mysteries somewhat abated, but the Christian Doctors thought the time was come for them to explain more at large their speculative Dogmes. And then it was that they fell out into a Schism, that might have prov'd the ruine of Christianity, had not the merciful God prevented it, by hastening the death of *Julian the Apostate*. *Arius* made the Son and the Holy Ghost inferior to the Father: *Alexander* would have them equal, and of the same nature: *Basilins* of *Ancyra*, and his Followers, took a middle way, and affirmed the three divine Persons to be of a like nature. Can one imagine, if that Mystery had been fully explain'd in the preceding Ages, and those Explications made common, that there would have risen so many different Opinions about it. Perhaps you will say, that how plainly soever the Christian Religion may be taught, there will be always Heresies, as we have seen at the beginning of the Reformation, when no such obscurity might be pretended. But the Case is quite dif-

ferent, for besides that our Reformers had not the same Authority with the Apostles, nor the same deference paid to them; that each Sect had Reformers of its own, and that as to this Mystery, no new Heresies have been invented, but only the old revived; we ought to consider that the *Roman Church* having usurped the whole Power of the *Catholick Church*, and afterwards misused it, by erecting a most intolerable Tyranny, a great part of her Members thought they might deprive her of her Usurpations, by examining matters a-new. And then it happen'd, as ordinarily it does in Civil Wars, that the Heads not agreeing among themselves, each endeavour'd to make an interest as great as he could in the distracted Kingdom, and then modell'd his part into a separate State.

From all this, I conclude That the *Socinians* are very unjust, when they demand of us passages of the *Ante-Nicene Fathers*, not only for the essential part of this Mystery, viz. that there are three Persons, Father, Son, and Holy Ghost, and however one onely God; but even for the manner of it, as that they are *coequal, coeternal, consubstantial, &c.* They are no less unreasonable in catching hold of every petty difference they can perceive betwixt these ancient Writers, without considering that this Mystery being then not publickly taught, we can expect to find but some few footsteps of it in the Books of those times; or if we meet with more particular Accounts, the difference that may be betwixt 'em, ought not to surprize us; for it would be a Miracle, should it happen otherwise in such metaphysical matters, when they are chiefly preserved by way of Tradition.

What then, are we bound always to remain in the state of Children, and can we not be allow'd to frame to our selves any distinct Idea of that Mystery? This I will not say; but only that we ought to keep close to the definitions of the Church in this matter, as having been sufficiently examin'd in a time, when that tradition was yet fresh enough in the memory of men. It's true the *Arians* pretended to have Tradition on their side, as well as the *Catholicks*; but the first did not agree among themselves, *Arius, Aetius*, and the rest of the *Anomeans*, maintained their opinions chiefly by *Peripatetic Tenents*. The *Semi-Arians*, who made up the best and strongest part amongst them, own'd the Son of God to be of a like Nature with his Father, which sentiment differ'd but in words from the *Orthodox*, as a learned Author has lately observed (i). So that the true Tradition was soon discerned and received, and it is both absurd and unjust to call in question the decision of the ancient Church again, in a time, when we want most of the proofs and helps that the Council of *Nice* and *Constantinople* had to determine the matter.

(i) *Du Pin.*
Nouv. Bibl.
T. 2. c.

I do not know your opinion about Ecclesiastical Discipline and Government, but I am perswaded that to deny the Church a lawful and moderate Authority, is to expose the Christian World to perpetual Schisms, and to trample Religion under foot. It's true that the *Roman Church* has carried this power to an unbounded height: but because there have been Tyrants, can there never arise just Princes? or, to be freed from the arbitrary commands of an imperious Monarch, shall we have no Governors at all? The Remedy would be worse than the Disease; and our Divisions both in Church and State, might have taught us the sad consequences of this mistaken Policy.

¶ I do not well know what to say to this Letter. It cannot be denied but that there are some things true: however, methinks, I perceive several mistakes in it. In this uncertainty, I thought the best way I could take was to publish it, in hopes that some of our learned Divines might vouchsafe to return an answer to it, and redress the Author's faults. For the Question seems one of the most important in Ecclesiastical History: Whether the Mystery of the H. Trinity has been openly taught, and before all sorts of People, during the three first Centuries? I shall wait a month or two for some Answer; and if during that time there comes nothing to my hands, I shall endeavour myself to make some remarks upon this Letter.

LETTER IX.

ARGUMENT.

A Way to preserve Fruits sound and entire from one Season to another. The Nature and Composition of Glass, and its chief properties explained. That neither Air nor Water nor even the most subtile Odors can penetrate it, proved by several Experiments. Objections against these Proposals answered.

S I R,

YOU think it almost impossible to preserve Fruits a whole year, without losing any thing of their Color, Figure, Taste, or Savor: I suppose I have found a way that comes pretty near it, which you may try, whensoever you please.

Take

Take a Glas-vessel whose mouth is large enough to receive the Fruit, without hurting it, dry it a little by the fire, both to rarify the inward air, and to take away the humidity, that might be about the sides of the Glas. Then put in your Fruit which must be very sound and clean, neither too green nor too ripe; but take care above all that it be not wet, cover it with a stopple or lid of Glas, and seal it *Hermetically*, melting the brink of the lid and the lips of the vessel with the flame of a Candle, that they may be incorporated together: set this Vessel in a place neither too cold nor too hot, as a deep Cellar, whose air, having but little communication with the exterior air, may remain the whole year, almost in the same state: I say, that these Fruits shall be preserved sound without receiving any sensible alteration; which I prove thus.

Glas is made of the Ashes of a Plant called *Sonde*, and of Fearn, whose particles are of an irregular figure, and contain many porous and spongy Salts: which being exposed to the utmost activity of the fire have their corners broken, and their small superficies so polished, that they touch one another almost on all sides. However as the *Æthereal* matter is circumfused every where, and in a continual agitation; and that the fluid particles of the melted Ashes cannot resist the motion of this matter, so it gets a free passage betwixt them, but so streight, that neither the finest corpuscles of the air, nor the smallest atome of any thing besides it self, can pass through these pores. Thence it is that Glas is transparent, and withal impenetrable to any other bodies, but the small particles of light.

Thence likewise proceeds the fragility of Glas, for as it is not composed of branched particles that are intertwined together, but that they are only joyned by their superficies, and not so immediately neither, as to stop the passage of the *Æthereal* matter; it plainly follows, that they must be liable to an easy division. This however does not import that any other bodies besides that matter can pass through the pores of the Glas: For we know by daily experience, that the most refin'd Spirits are safely preserved in Glas-vessels, provided they be full and carefully stopp'd. Nay the most piercing Odors, as Oyl of Amber, Elixir or Spirit of Sulphur, and of Horse's Urine, included in a Bottle *Hermetically* sealed, do not sensibly transpire, how hard soever the Bottle be shaken, and the Liquor heated by that motion. When you cut the bark of a green Cedar-tree, there comes out a most strong and piercing Spirit in the form of smoak, which however cannot penetrate through the pores of a Crystal Viol, extremely thin, and sealed with melted Glas, so far as to impart any thing of its smell to the Water in the Viol. Of odours, those that

are

are continually emitted from the bodies of living Creatures are none of the weakest, as appears by the quick smelling of Dogs : and yet a Gentleman having put a Partridge into a thin Glass Vessel, which he closely stopp'd, and plac'd in a dark corner of the room, and having let out a Spaniel, which ran about a long while; however neither the Dog nor the Partridge were ever sensible that they were so near one another.

If the subtle corpuscles of odours cannot be admitted through the pores of the Glass, much less will the grossest particles of the Air and Water get entrance there. And therefore a Bottle having been heated and fill'd with well-dry'd and pounded Salt, and then Hermetically seal'd, it was let down into a pit, and there left a fortnight in the water, after which time it was drawn up again, and the Salt found as dry and entire as when it was first put into the Glass. Nevertheless I will not deny that this experiment having been reiterated several times, it once or twice happen'd that some moistness was perceiv'd on one side of the Bottle, which yet does not import that the Water penetrated through it, for then it would have wetted it all over; but only that the Bottle having not been sufficiently heated, nor the Air sufficiently rarefy'd, the said Air remain'd in the Bottle, had been condensed into Water, by the coldness of the Pit.

These Experiments, the truth of which I cannot suspect, as having been made by curious searchers of Nature, perswade me, That the external agents, as air, vapour, exhalations, water, and the like, which produce more effectually the corruption and dissipation of bodies, cannot operate upon such as are closely included in Glass.

But you will say, That the corruption of Fruits proceeds from an internal Principle, *viz.* from the fermentation of their juices, which is indeed increas'd by the action of the air, and the nitrous, watery, and other heterogeneous bodies, which its corpuscles contain in their cavities: but cannot altogether cease, tho you take away this partial cause. Besides, the fermentation of soft and tender Fruits, as Cherries, Straw-berries, Ras-berries, Corants, Goose-berries, Plums, Figs, Grapes, and the like, is extraordinary quick, and may be accidentally increased in this Glass-Vessels by the natural weight and pressure of these Fruits, which by their position being directed towards the bottom of the Glass, must needs bruize one anothers skins, mix together and ferment the more violently, that there is neither room nor passage to evaporate.

This difficulty seems to overthrow all the former speculations; however before I give 'em over for lost, I shall surmize the following

ing reasons, experiments and conjectures. 1. That when Fruits have attained a certain degree of ripeness, they remain for a while in that state, provided they be gather'd at that time, and taken away from the action of the Sun. 2. That if they come afterwards to ferment and rot, this proceeds either from their mutual pressure, or from the impression of aerial, nitrous and watery corpuscles. 3. That if it were not so, no Fruits could be kept a week. 4. That in the Southern parts of *France* they use a very easy way to preserve bunches of Grapes till the very months of *April* or *May*: they cut 'em in fair weather, and chuse such as are white, thinly set, of a competent maturity, and whose Grapes are somewhat big; they hang 'em in a shady place, and shelter'd as much as possible from the effects of the Sun and Wind; and unless the season be extraordinary moist, it never, or but very seldom happens that they rot, but only that they insensibly dry away, and lose their taste by length of time. From all this its plain, that the fermentation of Fruits comes either from their pressure one upon another, or from the operation of the Air and Sun; and that Fruits included in a Glass Hermetically sealed, and kept in a shady and temperate place, will be only exposed to the first inconveniency: so that if there could be found an Oyl without any smell and taste, and that Fruits were made to swim in it, and both included in a Glass-vessel stopp'd as before, this would methinks do the work effectually; for such an Oyl having no particles thin enough to enter into the pores of Fruits, its gross and fat particles would stop the said pores, hinder the overflowing of the juices, and consequently the fermentation.

Since I writ this, I have been inform'd by a worthy Gentleman, a great lover of Natural Philosophy, of a curious Experiment, which wonderfully confirms my conjecture, viz. that he had preserv'd Fish fresh, having been before cleans'd, in a Glass Vessel fill'd with Olive Oyl, and carefully stop't, a whole year; and that neither the Oyl nor the Fish lost any thing of their taste.

And therefore to avoid the trouble of Sealing the Glass Hermetically, or the danger of breaking it in melting its lips, it would perhaps suffice to cover the joyning of the Lid and Vessel with several layings of Clay and Paper between them; for that this is enough to keep out the air and moistness, appears by the daily experience of the *Chymists*, who preserve in long neck'd Bottles stop't that way, not only their Salts and Oils, but even their most volatile and spirituous liquors.

LETTER X.

ARGUMENT.

Mr. Locke's Opinion about innate Idea's rejected. That we have a natural and positive Idea of Infinity. That it is the same with that of the Immensity of God. Act. xvii. 27, 28, explain'd. That Infinite Space is the most real of all Beings. Dr. Sherlock's Objections answered. Difference between indeterminate and infinite. Metaphysical, Theological and Physical Arguments for our Hypothesis. That the last Particles of Bodies must needs be hard and rigid, and that therefore the subtil matter of the Cartesians is an unaccountable Fagment.

S I R,

YOU will needs have my opinion about innate Idea's, and you are not content that I refer you to so many Authors as have discoursed of 'em. Mr. Locke seems to you to have demonstrated their non-existence so plainly, that you could wish, for the honor and tranquility of mankind, he had superseded from so dangerous an undertaking. You neither approve the high flights of *Descartes*, nor the base Idea our *English* Philosopher gives of humane Nature. You would have me to confute 'em both; as if it became every sorry writer to meddle with so great names, or as if it were an easy matter, to find out new notions on a subject, that has so often been brought under examination espially for me, who am so far from finding fault with 'em, that I believe they are both in the right in some respect.

However I would Mr. Locke had spared some harsh expressions, as as that a (a) *fœtus in the Mother's womb differs not much from the state of* (a) *Essay*
a Vegetable; (b) *that a decrepit old man is not far above the condition of a* *Cenc. Hum.*
Cockle or an Oyster. Such passages as these joyned with his earnestness *Underst.*
 in decrying all innate Idea's, either of God or of moral Vertue; in *p. 14.*
 proving that the soul sleeps by wholes, as well as the body; that it is *(b) p. 64.*
 a *Tabula rasa*, a white paper, whereon nothing is naturally engraven, but that our senses and reflexions write on it all that we come to know by succession of time; his exalting the state and knowledge of Beasts: All this, I say, would induce any one, who were not thoroughly acquainted with the Author, to believe that he is not much inclined to grant immortality to a substance, for which he has
 I For
 little esteem.

For my part, as I am perswaded that Mr. *Locke* is far from such thoughts, and that if there be any color for drawing such consequences out of his Book, it proceeds only from this, that he has applied himself more to pulling down than to building up. I shall therefore take the liberty to propose my sentiments in some things, wherein I differ from him, such as the Idea of God, which I hold to be innate or natural to thinking beings: And I am the more willing to publish my reasons for this opinion, that it is extremely beneficial to mankind.

If we have a natural Idea of *Infinity*, we have a natural Idea of God; for God alone is infinite. Mr. *Locke* will not deny the consequence, and as to such *Cartesians* as would contest the reason I give for it, viz. that God alone is infinite, I refer them to my 3^d Letter, wherein I have sufficiently prov'd that the whole mass of Matter cannot be infinite, and consequently no part of it.

That we have an Idea of Infinity is confess'd on all sides, the question only is, how we came by't? The Gentlemen of Mr. *Locke's* opinion will not grant it proceeds immediately from God, and that we see as it were a rough draught of his essence, when we contemplate the Idea of Infinity: So that I am only to prove that this Idea cannot be formed by the various complications of all the others wherewith the senses furnish our understanding. And then this Idea must needs be natural, or come immediately from God, which is all one, as to my present design.

That the Idea of Infinity cannot be form'd by sensible Idea's, I demonstrate thus: The Idea's presented to my mind by the senses are Idea's of finite objects variously complicated by the understanding, which is a finite power too: But there is an infinite distance betwixt finite and infinite; and therefore our limited understanding cannot out of finite Idea's form an Idea of Infinity.

It would be unprofitable to alledge that at least we can get that way a negative Idea of Infinity? for a *negative Idea* signifies nothing at all; or if these two words put together have any sense, they only express that there is no relation between two Idea's that we silently compare, viz. that which we have, and that which we look for. Being much conversant with corporeal objects, we may indeed make some estimate from them, and so imagine that 100,000,000, fathoms or ages come nearer to immensity or eternity, than a line or a minute; but the first are in reality as far from infinite extension and infinite duration, as the last. And as a man who sounds a fathomless deep, has not any more distant knowledge of its depth, when he has let fall his line to the very end, than when he first put it into the water; so, after we have wearied our selves with making all possible

possible additions to unity, we are not a jot nearer advanc'd to an Idea of Infinity.

Thence it's plain that those who suppose to get the Idea of infinity that way, and by adding at last this negation without *Limits*, mistake the Idea of indeterminate for that of infinite. But since indeterminate and infinite are objects really different, the first expressing but our ignorance of the real extension or duration of an object, and the second a real and positive quality of the object to which it is ascribed; since two Ideas how like soever they be conceived are not one and the same, and since a true Idea ought to represent the object so as it is in it self, and that the Idea of an indeterminate or indefinite extension does not represent real and positive infinity: it plainly follows that the Idea of indeterminate is not that of infinite.

This mistake comes chiefly from two causes, first from our confounding the notions of positive and compleat, as Mr. *Locke* does all along; because we are accustomed to pass over, or consider but slightly such Ideas as do not strongly affect us. Secondly, Because by an overgreat familiarity with corporeal things, we have used ourselves to measure and distinguish by them the objects of the intellectual world, whence proceed our gross Ideas of spiritual beings, and that we have so few proper names to express their qualities. Thus men having invented no proper word to signify *Infinity*, but contenting themselves with a negative expression, they are apt to imagine the thing as negative as the name, and to conceive infinity as an *Ens rationis*, a supposition made at pleasure which includes no reality.

But the necessity that there is that there should be an infinite being, ought to have undeceived us, and convinced us of its real existence. We cannot conceive time without eternity, for time supposes a beginning, and beginning a cause. Neither can the existence of the innumerable and various creatures, which adorn the Universe, be fully conceiv'd and explain'd, without the supposition of a Creator infinite in Wisdom, Power and Goodness. And therefore since there is an Infinite being, since we have an Idea of it, being able to distinguish it from finite and indeterminate, since it cannot be acquir'd by the senses; it remains only that it be natural, or that it come immediately from God.

The senses are so far from helping us to this discovery, that to be successful in it, we must abstract our thoughts from all sensible objects, that being empty of the Creatures, they may be filled with the Creator. And accordingly, we find by experience that if we suppose but for a moment all other beings to be annihilated, besides us thinking, our thoughts will presently sink into the bottomless deep of im-

60 Memoirs for the Ingenious.

mensity, which is that $\gamma\upsilon\omega\varsigma$ ὁ θεὸς that illustrious Character of the Divinity manifested in the soul of man, that proper Idea of real infinite, which we sought for, having neither beginning nor end, since it is not formed by a continued series of additions, and does not begin at a point, a minute, or an unity, nor terminate when our soul is tired with innumerable progressions.

A^d. xvii.
27, 28.

(d) $\phi\eta\lambda\alpha\phi\acute{\alpha}\omega$.

I have often admired the deep sense of that famous passage, where St. Paul teaches the *Areopagites*, that the end of Mens Creation (c) is, *that they should seek God, if happily they might feel after him and find him;* or as the French translation has it, *Sils pourroient le trouver en tatonnant.* The word used in the Original (d) signifies to seek something as a blind man does by groping and feeling about after it, and lively represents the fruitless endeavours or fortuitous successes of those Philosophers, who seek God in the Creatures, and labor to frame an Idea of his infinite perfections, by putting together all the perfections of corporeal beings. To redress them he adds, *that he is not far from every one of us, for that in him we live, we move and have our being:* which shews that the fittest place to meet with God in, is our own soul separated from corporeal objects, and that the truest notion we can have of the Creator is to conceive him as that infinite all, which contains all the Creatures, in whom they exist, in whom they live, and by whom they move.

(e) See
Letter 3.

If it be objected that it is a debasing of the Essence of God to conceive it under the Idea of an infinite space, which if it be any thing at all, is the nearest to nothing, or that it is to make God extended, and consequently corporeal. I answer, 1. That Space is a real Being, for that it has properties, and I have prov'd it (e) to be indivisible, Penetrable, infinite, independent and Eternal. 2. That created Beings have indeed some conformity with nothing, in that they have begun and may cease to be; whereas infinite Space being Eternal and independent, is of all things the most remote from nothing that can be imagin'd. 3. That this pretended conformity between Space and Nothing is only a mistake of our Senses, used to material objects; for tho it be nothing corporeal or created, it's nevertheless a most real and necessary Being. 4. That no object is so far from the notion of corporeity, as the Idea of Space; for Matter is finite, divisible, and impenetrable; and Space infinite, indivisible and penetrable. 5. Tho the immensity and simplicity of God induces me to conceive at first his Essence under the notion of Infinite Space; yet I do not stop there; but only make use of that Idea to advance further in the knowledge of his perfections. For because I see that the Idea of Infinite Extension cannot be annihilated, I conclude from thence that the being represented by it is real, independent and eternal: And as con-

tingent and annihilable Beings must needs have a cause of their existence and duration; I conclude that they owe both to this real and independent Being. Moreover, as some of those Beings are endow'd with several perfections of knowledge, power, wisdom, justice and goodness, I infer that this real Being possesses them all eminently and infinitely, and that he is omniscient, omnipotent, all-wise, all-just and all-good.

This Notion being rightly conceiv'd, all the Objections that may be made against it, fall of their own accord, which I shall shew in what has been alledg'd by one of the greatest Masters of Reason in this Age (a). 'We have, *says he*, an imagination of infinite space, 'which we can set no bounds to; but how far soever we extend 'our thoughts, we can still imagine something beyond that; but then 'we have no Notion, that space is any thing but only a capacity to 'receive something: nay, it seems to me to be nothing else but an 'imaginary *Idea* of Extension separated from Body and Matter; as 'we conceive place to be distinct from the Body which fills the place, 'and therefore that if the Body were annihilated, place would remain still of the same dimensions which the Body had that fill'd it. This, I confess, is true of the *Idea* of indeterminate, but not of the Notion of real Infinite, which offers itself to our mind, when we abstract our thoughts from the consideration of Creatures; so that this *Idea* being not formed either by addition or subtraction, it can neither be encreased nor diminished.

(a) Dr. Sherlock
Vind. of the
H. Trinity.
p7.6.

(b) 'It is not the defect of our Imagination that we cannot conceive an infinite Extension, but Reason tells us that there neither is 'nor can be any such Extension, but what may be extended farther: 'now what cannot be, cannot be a real Being, for whatever is real, is. I own that indeterminate cannot be infinite; but it follows not from thence, that infinite itself does not actually exist. Our abstract *Idea* of Infinity is true, positive and plain enough; for it represents its Object so, as really it is, *viz.* penetrable, unmoveable, indivisible, without beginning nor end; tho' it be not as *adequate* and compleat as that of a Triangle or a Square; it being contradictory, that a finite Spirit should perfectly comprehend Infinity.

(b) p. 77.

(c) 'If a Spirit be omnipresent by infinite Extension, the whole 'substance of the Spirit is not present every where, but part of it is 'in one place, and part in another, as many miles distant from each 'other, as the places are where such parts of the omnipresent Spirit 'are. What is indivisible has no parts, but infinite Extension or Space is indivisible; (d) for what can be divided, must be so, by any matter or body coming between its two separated parts, which must remove their extremities farther: but there is none such in

(c) *ib.* p. 80.

(d) See
also Letter
3: P. 22.

simple

simple and infinite Space, and therefore infinite Space is properly indivisible. Now what has no parts is not present by parts, and what is not present by parts, is present by its whole substance; and therefore an omnipresent or infinite Spirit is present every-where by its whole substance.

Your confused Notions of Extension will still suggest to you, that this is a meer Sophism: But suppose a Man were so ridiculous as to assert, that the Divine Power which operates amongst Angels, is not the same that keeps the Devils in awe, and therefore that God has two Powers of different nature, one to govern Heaven, and the other to over-rule Hell. By what Reasons could we convince such an impertinent Heretick, unless it were by shewing that Power is a spiritual thing, and consequently indivisible.

But you urge, that supposing the terrestrial Globe were annihilated, there would still remain a measurable Space within the concave *Superficies* of the sublunary Orb. Why then I do not well conceive how this Space could be measur'd; for there would remain no æthereal matter, thro' which the visual line of a Man plac'd in the imaginary middle of this emptiness, could penetrate to the Stars, and they reflect their beams to his eyes. The most that you can gain by this, is only that an indeterminate number of Bodies may be made to fill this penetrable Space, which being done, they would certainly be measurable one by another; but it does not import that Space, abstractedly considered, is either measurable or divisible.

You may add that it follows from thence, that finite Spirits are indistinguishable: because, according to us, they have a penetrable extension, or are contain'd in it, and that this extension is indivisible. I answer, that finite Spirits are distinguished by their various thoughts and different degrees of power; that when they dwell upon Earth, they are farther distinguish'd by the several portions of matter they actuate: But whether the Angels in heaven, are distinguish'd one from another by some other properties, is what I do not know.

Last of all, you say that our hypothesis is only grounded upon suppositions; that we are not to argue from what God can do, but from what he has done; that all our Senses and Idea's assure us that in this World Extension and Matter are one and the same thing; whereas we have no certainty that they are separated in another World, or that they can be so in this. But methinks to have sufficiently shewn at the beginning of this Letter that we have a real and positive Idea of infinite Extension, and in the third that matter cannot be infinitely extended; whence necessarily follows, that there is another Being than Matter, to which this Infinity may be ascribed. And as this Being has been prov'd eternal and independent, and none but God can

can be so, 'tis likewise a necessary consequence, that it is God himself consider'd under the notion of *immense*.

According to Dr *Sherlock*, (e) "an Infinite Being, had not use and custom reconcil'd us to that expression, would be thought nonsense (e) *ib. p. 75.* and contradiction; for every real Being has a certain and determinate nature—An Infinite Being signifies a Being absolutely perfect, or which has all possible perfections: which has no other end of its perfections but perfection it self; that is an infinite Being, not which has no end of its perfections, but which actually has all perfections and can be no more perfect than it is—As for instance, infinite Wisdom, Knowledge and Power have fixt and set bounds, beyond which they cannot go. Infinite Wisdom knows all things that are knowable, and that are wise, &c.

I would desire the Dr, or any other Divine of his opinion, to explain to us their Idea of Gods immensity, or what sense they give of the following passages: *The heaven, and heaven of heavens cannot contain thee, O God,* 1 Kings viii. 27. 2 Chr. ii. 6. & vi. 18. *Canst thou by searching find out God—It is as high as heaven—deeper than hell—The measure thereof is longer than the Earth, and broader than the Sea.* Job xi. 7, 8, 9. *Whither shall I go from thy spirit? and whither shall I flee from thy presence? If I ascend up to heaven, thou art there: If I make my bed in hell, thou art there, &c.* Psal. cxxxix. 7, 8, 9, 10. compar'd with *Amos ix. 2, 3, 4.* Thus says the Lord, the heaven is my throne, and the earth is my footstool, *Isa. 66. 1.* compar'd with *Mat. v. 34, 35.* and *Acts vii. 49.* Can any hide himself in secret places, that I shall not see him, says the Lord? Do not I fill heaven and earth? Jer. xxiii. 24. I grant there are Hebraisms and figurative expressions; but that the whole should be metaphorical, and signify no more, than that God is omnipotent, without extending his Essence every-where, is what I cannot conceive: and I leave it to any impartial Judge to determine with which of these Hypotheses the true and proper sense of these Passages does best agree.

I endeavor'd in my third Letter, to shew that Motion was possible, with the supposition of the World's being full: but after second thoughts, I find it extreamly difficult, not to say impossible, without the mixture of some small Vacuities, at least for a moment. My Reasons are, 1. that the last Particles of Bodies cannot be fluid, soft or flexible. 2^{dly}, that Motion is successive, and therefore requires some time to produce its effect, how swift soever it can be conceiv'd. 3^{dly}, that the subtil matter of the *Cartesians* is either a meer figment, or differs but in name from the small vacuities that we assert to be interspersed amongst Bodies.

1. That the last Particles of Bodies cannot be fluid, soft or flexible, I prove thus. A fluid is a body whose parts are actually divided,

ded, since they move several ways one about another, but if these parts be made up of other Particles that are fluid again, or soft and flexible, which is but a different degree of fluidity, they must likewise be actually divided, and thus *in infinitum*: so that the smallest Atom imaginable, would contain an infinite quantity of Corpuscles actually divided; but an infinite quantity of Corpuscles actually divided, must needs take up an infinite Space; and therefore, according to this Hypothesis, the smallest Atom imaginable must needs take up an infinite Space.

By this I do not mean to prove that the smallest Particles of Bodies are indivisible, it being enough, for my present purpose, that they be hard, solid and rigid, which is a plain consequence from the absurdity that there is in conceiving them soft, fluid and flexible: But if they be hard, solid and rigid, their figure cannot be easily altered, or some time at least is requir'd to produce that alteration. And therefore, as in the various motions and complications of Matter, they must needs leave betwixt 'em several of their pores to be filled immediately by these insensible Particles: if some of these Atoms chance to light into such Pores, as are not exactly adapted to their figure, there must needs be some vacuity for some time, till either the figure of the Atom be alter'd, or that it be expelled by another better fitted to that place.

Regis Phys.
l. 2. part 2.
ch. 6.

The *Cartesians* think to obviate this difficulty, by telling us, that the Particles of their subtil matter are so small that they have no determinate bigness or figure, and so swiftly moved that they penetrate through all the smallest pores and corners, that are inaccessible to other corpuscles. For my part I confess, I am not so quick as to conceive a body of an indeterminate bigness and figure: for Reason tells me that whatsoever is corporeal and finite, is terminated and figured, and magnifying glasses assure me, that what I took for round and polished corpuscles, are irregular polygones. Fluids are indeed so far, of an indeterminate bigness and figure, as to change almost every moment, but it has been invincibly proved that the last particles of bodies cannot be fluid; so that even those of the subtil matter being hard, solid and rigid cannot be easily alter'd and accommodated to the figure of the pores into which they may chance to enter.

It remains then only for these Philosophers to say that these particles are indivisible mathematical points or spiritual substances: but mathematical points have no quantity at all, so that innumerable millions of them do not make up any sensible extension; whereas the last particles of matter are supposed to fill all the smallest pores and vacuities of bodies.

But if these Gentlemen should chuse to turn the insensible corpuscles of their subtil matter into so many spiritual substances: I should then be very unwilling to contest with 'em. For as parallelograms under the same parallels and upon equal bases, are equal; as a Triangle may be made equal to a Square and all Polygons to one another; nay as rectilinear figures may be pretty nearly adapted to circular ones, by the Method of indivisibles: so we conceive, that a Spirit, which should have an absolute power over a certain portion of matter, might change its shape at pleasure, and give it any figure whatsoever, without altering its bulk. If the *Cartesians* will have recourse to such an impertinent notion, I give them leave to do it, and I dare say it will not be so absurd as the supposition of an inanimate matter, taking all forms whatsoever in an instant and of its own accord. Otherwise, their subtil matter having neither the properties of Bodies, nor those of Spirits, they must be forced to grant that it is a meer figment, or at least that very space and incorporeal extension, which they are so loath to acknowledge.

Perhaps you will object that by taking the Idea of infinite Space for the divine immensity, I fall into the error of those antient Philosophers, who made God the soul of the world. But if my opinion in this were conformable to theirs, this would be so far from proving it erroneous, that from thence it would only follow, that I have the best and learnedest part of Antiquity on my side. I have shewn that my sentiment agrees with our natural Idea's and with the notions and phrases of the H. Scripture, and that suffices me for the present. I may methinks, already boast of having laid a pretty sure foundation for Metaphysicks and Physicks, altogether opposite to *Cartesianism*, in proving the reality of the Idea of infinite space and its identity with that of the immensity of God; as well as in shewing that extension is not the essence of matter, and that extension in reference to matter is nothing else but the union of several solid and impenetrable corpuscles: This might be confirmed by comparing my hypothesis with those of the most famous among our modern Philosophers as *Descartes*, *Gassendi*, *Borelli*. *Malebranche*, *Bernier*, &c. but this would require too much time and room. I may do it, perhaps, in some other Letters, especially if you make me some objections worth answering, or if some new and weighty argument offer itself to my mind.

MEMOIRS FOR THE INGENIOUS.

CONTAINING
Several Curious Observations in *Philosophy,*
Mathematicks, Physick, History, Philology, and
other Arts and Sciences.

IN
Miscellaneous Letters.

By *J. DE LA CROSE*, E. A. P.

MARCH, 1693.

To be continued Monthly.

VOL. I.

————— Et te
*Semotum a curis veram adhibe ad rationem;
Ne mea dona tibi studio disposita fideli
Intellecta prius quam sint contenta relinquo.
Nam tibi de summa Cœli ratione, Deumq;
Differere incipiam, & rerum primordia pandam.*

Lucret. l. 1.

LONDON, Printed for W. Rhodes near Bride-lane in Fleet-street;
And for J. Harris at the Harrow in the Poultry. 1693.
Where are to be had the Memoirs for January, and February.

MEMORANDUM

FOR THE

SECRETARY

OF THE

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WASHINGTON

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March, 1693².

(67)

Vol. I Numb. 3.

Memoirs for the Ingenious.

MARCH, 1693².

LETTER XI.

To the Reverend Mr. NORRIS, Rector
of Bemerton, near Sarum.

ARGUMENT.

A Vision of the Author. A Spirit explaining to him the two first Verses of Genesis. That Matter cannot be eternal. That God created at first an indefinite number of Spirits, distinguish'd into several orders. What Laws he gave them. How the lowest orders were seduc'd by Lucifer, and his Accomplices. Michael and the good Angels opposing the bad. The insolent Petition of the seduc'd Spirits to God Almighty. Their transmutation into Matter. Possibility of this transmutation. Usefulness of this Hypothesis. Objections answer'd. Direct proofs of it. Rom. viii. 19-23. Job xxxviii. 7. Hebr. xi. 2. explain'd.

Reverend Sir,

Tho every one knows you are one of the best Judges of Metaphysical notions, yet I should not presume to publish these under your name, if I were not satisfy'd of your candour and goodness by your conversation; as well as of your penetration and judgment, by reading your Books. However, I would not have the

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World believe me so unreasonable, as to require so great a patronage for these Speculations, which yet I look upon as a dream. I offer you them only by way of consultation, being resolved to reject 'em as a vain fancy, or to entertain them as an useful discovery, according to your Determination.

I was lately with some learned men, where we disputed about the state of Beasts: I maintained some time the opinion of *Des Cartes*, as that which seemed to me the most conformable to Religion and Reason; however I defended it but faintly, because of many actions of Brutes, which are unaccountable by meer Mechanism. On the other side, I never could conceive how matter can become capable of thinking; nor that God should have created such noble substances as Spirits, for no other purpose than to govern corporeal Machines.

I came home full of these thoughts; neither could I the rest of the night apply my self to any other study, this having so much prepossessed my brains: at last I went to bed, and fell asleep, but had not lain long, when I was suddenly awaked, as tho some body had pull'd me by the arm; and methought I saw my Chamber full of light, and brighter than ever it was at noon day. This unexpected accident strangely surpriz'd me, and I was going to rise, when I fancied to hear a voice speaking to me, almost to this effect: Be not afraid, I am sent to impart to you the greatest reward that you can expect in this life, for your endeavouring to promote Natural Religion and Christianity; I come to discover to you a Mystery, by which you shall be able to solve most of the difficulties, which the *Atheists* and *Deists* make against both.

I needed not more powerful Motives to raise my attention; so that my Spiritual Master, seeing me ready to listen to his instructions, pursued his discourse thus. This mystery is contain'd in some passages of Holy Writ, not understood by Literal Criticks, as being the worshipful remains of an ancient Tradition, which the ignorance and superstition of former ages has blotted out of the memory of man. I shall begin with the two first verses of *Genesis*, and mention some others by the way, leaving them to your farther enquiry.

In the beginning God created the Heaven and the Earth. The most natural sense of this Expression, *In the beginning God created*, is certainly *When God thought fit to give a being to the Creatures*: and 'tis equally absurd and impious to infer from thence the eternity of matter: for how can the words *in the beginning* denote Eternity, which has neither beginning nor end? Besides, what false notions soever some Philosophers may have of Eternity, you must not imagine

gine it to be properly successive; because that which has neither beginning nor end, is infinite; that which is infinite, is indivisible: for if it were divisible, it could be encreas'd or diminish'd; and that which is indivisible has no parts, and therefore cannot be subject to succession.

I grant that **ברא** *Bara* signifies as well the modelling of matter into new forms, as its first creation: but I don't know any instance. where the word **ברשית** *Beresbith* translated *ἐν ἀρχῇ* by the *Septuagint*, and *In principio* by the vulgar *Latin* Interpreter, may be adverbially taken, so that the sense be *Antequam Deus Crearet Caelum & Terram, Before God created the Heaven and the Earth*, or before he gave them the form they have at present: for the Conjunction *and*, plainly shews that the second verse has no dependence on the first; but is the beginning of a new sense: *and the Earth was without form and void.*

If then *In the beginning* signifie the first moment of time, or of the existence of the Creatures, **ברא** *Bara* must necessarily denote their first creation, and the *Heaven* and the *Earth* must needs be the general names of these new Beings.

I shall not insist upon the absurdity that there is in asserting the pre-existence and eternity of matter; for 'tis too obvious a contradiction to ascribe Infinity either in duration or extension, to a dependent and annihilable being.

You ought to be so far (continued my invisible Teacher) from conceiving dull and unactive Matter to be Eternal, that you ought not to consider it as the first and immediate work of God. For how could the most perfect Being create at first the most imperfect of all? how could he imprint the illustrious footsteps of his infinite Wisdom and Knowledge upon senseless things? or shew his eternal Goodness and Justice towards Creatures incapable of happiness and misery, and consequently of reward and punishment? Nothing perhaps has more contributed to the strengthening of *Epicurism*, *Spinozism*, and other Atheistical Systems, than the great disproportion that there is between Matter and an infinite Spirit, and the little appearance, that the former should be the immediate production of the latter.

The H. Writ calls God the *God of Spirits* (a), and the *Father of Spirits* (b); but never the God or the Father of Bodies. The least that this expression can import is, That Spirits are a more particular and immediate production of God, than Bodies; for **ברא** to create, signifies no more than *to make*, if we believe the *Septuagint*, the most ancient translators of the Bible, and the Evangelist S. John, the best Interpreter of all. Now a *Maker* uses instruments, or at least a pre-existent

(a) Numb. xvi. 22. &

xxvii. 16.

(b) Heb.

xii. 9.

existent Matter to make his work out of ; but a *Father* begets his Children out of his own substance.

To be short and plain with you, I conceive that the most perfect Being, the God and Father of Spirits, produc'd at first an indefinite and unconceivable number of Spirits, spread all over, if I may so speak, in the infinite space of his immensity. They were all penetrable, indivisible, active or self-moving, intelligent and thinking Beings : but for the rest endued with several degrees of Knowledge, Wisdom and Power. And as the most perfect Being deserves to be lov'd above all, so he created them free, that they might chuse to love him, and prefer him to all the creatures, and even to their own selves. And therefore the laws he prescribed to them were comprized under the two general heads, that are still the eternal Rule of all the Spirits created to live in Society, *viz.* That they should love God with all their might, and their fellow Spirits as themselves, promoting their encrease in Knowledge, Wisdom, Power and Felicity, with as great a zeal and earnestness, as they could with the others would do for them. The conditions annexed to these laws were, that they should be liable to an augmentation or diminution of their spiritual qualities and happiness, according to the use they should make of 'em : and thus ascend from a lower to a higher station, if they should obey Gods commands, or be detrudd from a superior to an inferiour order of Spirits, if they should infringe his laws : and even lose the remainder of their perfections, if they were of the lowest order of Spirits. To this he added an express prohibition of approaching the Throne of his Majesty ; enjoinning them to remain in their respective stations, until he should be pleased to raise them higher, as a reward of their obedience.

This great mystery is ænigmatically conceal'd in the words *Heaven* and *Earth*, by which the sacred Author distinguishes Spirits as in two great orders, celestial or sublime, and terrestrial or of a meaner capacity : for by these names cannot be understood either the Universe, which was not then in being, or the material Heaven and Earth, which were created but on the second and third day ; nor even the *Chaos*, which is spoken of immediately after, but distinguish'd from the Heaven and Earth mention'd here, by the Particle *and* ; so that it would look as a repetition, not well becoming so great and judicious a Writer as *Moses*, in such an accurate and pompous description, if something new and mysterious were not meant by the names of *Heaven* and *Earth*.

'Tis from this original Allegory that the Prophets have drawn those figurative expressions, by which they represent the Church and its

March, 1692.

71

its Ministers under the names of Heavens, Sun and Stars, and the Empires of the World by that of Earth. Add to this that famous passage of *Job* (c), where God himself speaking of the Creation of the World, says that *the Morning-Stars sung then together, and all the* ^{(c) *Job*} _{xxxviii. 7.} *Sons of God shouted for joy.*

According to the common acceptation, the Interpreters are extremely puzzled what account to give of *Moses's* forbearing to speak of the Creation of Angels. Some say it was to prevent the Idolatry of the *Jews*; which if it were true, must have hindred him from mentioning them in the rest of the *Pentateuch*. Others pretend that their Creation is tacitly included in that of *Light*; but it appears by the Context that the sacred Author does not speak there of Spiritual Lights or Intelligences, but only of those subtle corpuscles or æthereal matter, which cause in animals the sensation of Light. Last of all, there are some, who seek the Angels in the first verse of the second Chapter of *Genesis*, where 'tis said, *Thus the Heavens and the Earth were finished, and all the host of 'em*. But tho they may be in the right, and that the *host of Heaven* may comprehend the Angels as well as the Stars, yet this does not determine the question, and it remains still to enquire at what time these Spirits were created. So that, when all is done, you shall hardly find any explication that suits the whole design and narration of *Moses* better than mine.

But to return to my story; how long all these Spirits persisted in their integrity, I am not empowered to teach you; neither would you be able to comprehend it, because time had not then any of the common measures that now give an Idea of its duration. Only I shall put you in mind that dispositions must be easily engraven, and extraordinary lasting, in a Spirit newly produced, and void of prejudices; and that the satisfaction of serving God with the reward attending it are so great, that had all these Spirits remained in their duty any considerable time, 'tis not likely that they would ever have apostatiz'd of their own accord, or suffer themselves to be seduc'd by others.

And therefore 'tis very probable that soon after the Creation, some Spirits of the first Rank, which were but few in comparison of the vast numbers of all the other orders taken together, considering their natural perfections, came to admire them so much as to imagine that they could not be farther improved, and that they were only to take care that their glory should not be darkened by becoming too common: which would infallibly happen, if time were allowed to the Spirits of a lower station, to improve their qualities, so that at last they might become equal to them.

There

There was that same difference among each order of Spirits, that there is yet among men, that is, that there were some eminent above the rest, (for I might prove to you, if it were not too far from my subject, that this difference among men does not chiefly proceed from the Organs of their body. But leaving this Question to another time) one of the most eminent Spirits was that which an ancient Tradition calls *Lucifer*, and the Prophet *Isaiah* הַלֵּל בֶּן-שָׁחַר *the Morning Star, the Son of the Morning*; because he shin'd among other Spirits, as the Morning Star or the Planet *Venus* does among other Stars. And he it was that laid the Plot, and form'd the design of erecting a Kingdom amongst the Angels: in order to which, he first drew into his snare some Spirits of his rank, by representing to them what dishonour it would be, if they came to be confounded with the vulgar sort of Spirits; how much their quickness and excellency in Wisdom, Knowledge and Power would lose of their Lustre, if they became common to all? That to prevent this unhappiness, they ought to endeavour by all means to keep the inferior Spirits under: That he had imagined a way, which would not fail to succeed, if they would but help to the performance; namely to bring the lower Spirits into disgrace with God, by persuading them to approach the Throne of his Majesty, notwithstanding his defence, in hope that by this sight they should receive a sudden improvement of their spiritual qualities and happiness; adding, that this prohibition had been made by the advice of some of the highest Spirits, who envied their advancement. It's sure, pursued the crafty Prince of Darkness, that God will not grant at their insolent demand, what is to be the reward of a long-continued Obedience; but that he will rebuke them, and expel them ignominiously from his Throne: Then these Spirits being banished for many ages from the presence of God, must be forced to have their recourse to us, as to the first Ministers of the Almighty. It may be too that the unexpected Rays of the Divine Majesty will dazzle and confound them, and render them insensible for a long time. But it will be the better for us, since we shall remain the sole dispensers of the favors of God, distribute them at pleasure, and Lord it over all that senseless and unmoveable World.

It seems that all this while *Lucifer* and his Confederates had forgotten that God is omniscient, or that he thought, that because he did not stifle their contrivance in the birth, he would suffer them to go on, and continue them in his grace, after they had performed this their wicked design, as tho he had been unacquainted with it. Though not only God himself knew it, but even some of the highest order

order of created Spirits, who persisted in their duty, suspected the Plot: and as soon as the Conspirators were departed to go among the lower sort to seduce them, they followed to oppose them. But it seems they came too late, and that these weak Spirits were already wavering; the fair pretences of Concernedness and Charity for them, whereof *Lucifer* made a shew, having already so far prevailed upon them, as to make 'em look on *Michael* and his Associates as envious Spirits; who by their exhorting them thankfully to acknowledge the gifts of God, rather than to endeavour to extort from him by an unbecoming importunity, what he would willingly bestow upon them in process of time, intended nothing else but to make them neglect the wholesom advice of *Lucifer*, and his Accomplices.

Any one who is acquainted with the craftiness of Politicians, and who hath observ'd how easily an unwary Multitude may be gull'd by ambitious Hypocrites, and how greedy Spirits are of infused knowledge, and sudden power, will undoubtedly grant that there is nothing in this supposition, but what is very natural and feasible. Besides, the Prophet *Isaiah* makes an evident allusion to it, in his Description of the fall of the King of *Babylon*. (a) *How art thou fallen from Heaven, O Lucifer, Son of the morning. ----- For thou hast said in thine heart* [that is, thou hast plotted or devised to do this] *I will ascend into heaven, I will exalt my throne above the stars of God— I will ascend above the height of the Clouds, that is, above all the Orders of Angels, I will be like the most high, and have a Kingdom as well as he.* S. Jude (b) likewise alludes to this contrivance, when he says of these wicked Spirits, that they kept not their first state, or original station, *ἡ ἐξουσία ἀρχῶν*, but left their own habitation *τὸ ἴδιον οἰκητήριον*. As also to the opposition the good Angels made against the bad, when he speaks of the contention of *Michael the Archangel with the Devil*. This makes me remember that tho the H. Writ mentions several wicked Spirits, yet it speaks more particularly of one eminent amongst 'em, to which it gives the name of *Διάβολος* Devil or Slanderer, Satan the Adversary, and the great Adversary of Mankind. See *Job* i. 6. *1 Tim.* v. 14. *1 Petr.* v. 8.

After these Testimonies, I need not, that I may shew the Antiquity and Universality of this Tradition, to have recourse to the Fables of the Gyants fighting against the Gods: and therefore I proceed. In consequence of *Lucifer's* advice, the deluded Spirits agreed among themselves upon an humble Address, as they call'd it, to the Divine Majesty, wherein they should represent to him, that since it was in his power, to have created them as perfect as *Lucifer*,

Michael

Michael and other Angels of the first Rank, and that he was yet able to endow them with the same qualities, he would be pleased to do it immediately, and not to let them sigh and work many Ages for a favor he had bestowed upon others at their first production: covertly insinuating, That in case he should deny their demands, they were like to make their Application to such of the superior Spirits, as would be willing to procure their increase in Knowledge, Wisdom and Power.

I let you judge whether such an Address was acceptable to God Almighty; especially having forbidden them to approach his Throne, or the Place, where he shewed more illustrious marks of his Presence, Glory and Majesty. Yet thither they came thronging with their *mutinous Petition*, which, as it were, put a stop to the Patience and Mercy of God, and made room for his Justice to manifest itself. For as this piece of Arrogance deserved the severest Punishment, and as they could not be cast any lower down, being already in the lowest degree of intelligent beings, he deprived them on a sudden of their spiritual qualities; so that instead of penetrable, indivisible, and self-moving, they became impenetrable, divisible, and unmoveable. Then driving them away from before his Throne, and throwing them into the lowest Regions, or, if I may so speak, the Center of the infinite space, they tumbled down one upon another; and were, if I may so express it, condensed into an indefinite number of corpuscles of various figures.

Thus the Earth, or the lowest sort of Spirits, became *תהו ובהו* *Tohu va-bohu*, *rudis indigestaque moles*, a confused and inordinate lump or mixture. I find the words *Tohu* and *Bohu* only in two passages of H. Writ besides, which both give the Idea of confusion and disorder, and not of vacuity or emptiness. The first is 1 Sam. xii. 21. where the Prophet threatens the *Israelites* with the destruction of their Commonwealth, if they revolted from God. *And turn ye not aside*, says he, *כִּי אַחֲרַי תַּהוּ* for afterwards is *Tohu* or confusion. The second is Isa. xxxiv. 11. where the Prophet describing Gods vengeance upon the enemies of his Church, and the waste and desolation of their Country, says, *But the cormorant and the bittern shall possess it, the owl also and the raven shall dwell in it, and it shall stretch upon it the line of confusion,* *קוֹ תַּהוּ* and the weight of disorder, *וּאֲבֵנֵי בָהוּ* where is to be noted that *קוֹ kav* properly signifies *une Table d'attente*, a Table or Stone for some inscription, upon which the story of their judgment should be recorded, a blank Table ready for an Inscription: and that this may be the sense of it appears by the root and the other derivatives of the verb *קוּהַ Kavah*.

In this last passage, the allusion to the Chaos is evident; and that we might not doubt but that it was a confused mass, and an inordinate complication of impenetrable and unmovable corpuscles, the Sacred Historian adds, that *darkness was then upon the face of the Deep*; to which answers that expression of S. Peter (a) and S. Jude, that (d) 2 Pet. the rebellious Angels are *kept in chains of darkness*. However, it appears by the temptations of the first man, and of too many of his posterity, that God reserved the Seducer *Lucifer* and his Accomplices for a more rigorous punishment. For having banished them from his presence, and deprived them of the Joys of Heaven, that they might be sensible of their unhappiness, he left them the use of their Spiritual qualities, which they still employ in disturbing other Spirits, especially those which stand yet upon their Tryal, Jude 6.

The malice of *Lucifer* having put the intellectual World into so great disorder, the all-good and all-wise God apply'd himself to restore it to its former lustre, as far as it was consistent with his justice: In order to which his Spirit moved *רוח* upon the face of the Waters, that is, he spread his fructifying warmth over and through that fluid mass, to give it life and motion, to prepare the seeds of Plants and Animals, and to dispose at last that confused and inordinate mixture into this regular and beautiful World.

Here my new Master stopp'd, and ask'd my opinion of his hypothesis: I answer'd him but by a smile; for I durst not open my mouth, for fear he should deal with my body, as the Angels of *Mahomet* are said to do with the Souls of the Deceased, or knock me down to the grave: So that perceiving by my looks that I rather admired his Discourse, than was perswaded of the truth of it, he encouraged me with fair words to make my objections against it.

Well then, Dear Spirit, said I, since you seem to aim at nothing but my instruction, I will freely offer you my difficulties. 1. I cannot conceive your transmutation of Spirits into Bodies; for I have been taught that Spirits and Bodies are opposite Substances, which have nothing common one with another, but differ as much, if I may so speak, as finite and infinite. Now a transmutation cannot be made, or at least conceiv'd, unless there be something wherein the opposite substances agree, that may be as the point whereat it begins.

2. This transmutation being suppos'd possible, what Arguments have you for it? for tho all the parts of your System hang pretty well together, and that your allusions to some passages of the H. Writ come somewhat near to the purpose; yet all this will never convince an unprejudic'd person, much less the Christians of this time, who

are perswaded that God created this World out of Nothing, and not out of pre-existent Spirits, transmuted into Bodies. So that unless you can prove your hypothesis *a priori*, that is, demonstrate as far as the subject can bear, that the Angels, Spirits, or incorporeal Substances, were created before this visible World; and that this was made up of part of those Spirits changed into matter; I beg leave not to publish your revelations, lest I should be taken for an Heretick, or a whimsical person.

3. Tho your hypothesis were not only possible, but even true, what use can be made of it? Or, why will you have me disturb Divines and Philosophers in the enjoyment of an opinion that they have been prepossessed of, time out of mind. I am resolved to live quietly if I can; or if ever I be brought to expose my self to great hazards, it must be to some purpose.

To begin with the last, answer'd the Spirit, If my time were not limited as well as the number of Sheets in your *Monthly Memoirs*, I might shew you that no hypothesis can give so good an account of God's Providence and Predestination, of *Adam's* temptation, and the entrance of Sin into the World, of the difference between Men and Beasts, of the sufferings of Infants and irrational Creatures, of the Creation and Immortality, of our Souls, of Hell and evil Spirits, of the universality of Christs death, in case there were other Worlds besides this: All points important enough to admit of an hypothesis that should give a plain and easie solution of them. For Philosophers think their suppositions indubitable, when they can prove that they agree with all observed *Phænomena*, and in such a case they are received without any scruple or contestation. But this way of Arguing would require too much time, and therefore I think best to leave it to your own inquiry, being perswaded that you will rest satisfied with the answers I shall make to your first and second objections.

1. You say that Spirits and Bodies are opposite substances, which have nothing common with one another: but you destroy your own objection by calling them substances, for then at least they agree in that, that they are substances. Perhaps because you have form'd no distinct notion of the word *Substance*, you are apt to imagine that an agreement in this is altogether insignificant: but unless you use that term as a meer sound without any meaning, you must confusedly understand by it the subject of all the properties of a Being. And what can be that subject, unless it be *extension*, infinite in God and finite in creatures, penetrable in Spirits, and impenetrable in Bodies? Whence it follows, that created Spirits and Bodies agree in three qualities, namely, *extension*, *limitation* and *dependency*. Be-

Before God created the world either intellectual or corporeal, there was nothing in being besides himself: for tho we have the Idea of an infinite space antecedent to the Creation, yet we cannot conceive it different from him, since there cannot be two real infinite, eternal and independent Beings. But when God created Spirits, he produc'd something new, that was not before: and therefore these new Substances had a Being, and consequently an extension different from his. So that they cannot be conceiv'd but as portions of a penetrable and indivisible extension, active or self-moving, and by consequence conscious of their own actions, and moving several ways in the infinite space. Now as they were conscious of their own actions, and motions, so they must likewise have been conscious of the actions and motions of others, which they met in their way: and as their motions might be quicker or slower, it follows that their consciousness or knowledge was capable of several degrees, and might increase or diminish, proportionably to the use they made of their freedom or *self-mobility*.

You will urge that I give you not the Idea of Spirits, but of most subtile and active Bodies. To which I answer, that it is your self who confound impenetrable and unmovable Matter with penetrable and active Spirits. And as for me, I follow the best director that can be, *viz.* the H. Scripture; which, since men have no proper names to express the essence of Spirits by, uses the words most approaching to it, as *רוח שני נפשוּמא, פּוּחַ, air, wind and breath.*

But to proceed, you cannot deny but that the disobedient Spirits lost in great part the knowledge of God and themselves, when they suffered themselves to be seduced so far by the persuasions of *Lucifer*, as to imagine that God would be in a manner daunted by a general Petition of all their Tribes, and induced to grant them what he had not thought fit to bestow upon them at their Creation, *viz.* a sudden increase of their spiritual qualities. So that their very Sin was the beginning of their transmutation, which will not appear to you altogether impossible or incredible, if you reflect on the foolish and extravagant notions of lewd Sinners, and on the dizziness which the noise of Bells and Cannons, or impertinent and nonsensical talkers cause in your head.

Thus, these giddy Spirits, coming before Gods Throne, were so dazzled at his glory, which the shrewd *Lucifer* had purposely conceal'd from them, that the unexpected and intolerable Rays of his Majesty joyned with the Conscience of their Sin, produced a sudden fear and amazement, which penetrated through their whole substance, deprived them of all sense and knowledge, and rendered them unmove-

able in a moment, so that they suffered something like to what happens to water or air that are congealed by an extream and sudden cold, or to our breath when it sticks at the glass of a mirror. These comparisons are gross, but I cannot use more proper speaking with you, whose Soul being included in a body can have but confused notions of its own nature. However if you remember the sudden Swoons, Benummings and Trances, which unexpected accidents are apt to cause in men: and then think that these differ but in degree from that terrible transmutation, you will not esteem this change altogether improbable. To this may be referr'd the fear the Antients had of dying, when they saw some outward marks of the Majesty of God. *Exod. xx. 19. Dent. v. 26. Judg. xiii. 22.*

I could not forbear any longer interrupting my Teacher. Your Comparisons, said I, are not good; for they are taken from the effects of Bodies upon Spirits united with Matter; whereas you are to explain the transmutation of Spirits into Bodies before Matter was created. Besides, the noise of Bells and Cannons, impertinent Talkers, the fear and amazement arising from unexpected accidents, do not change the natural properties of the Soul; but only so occupy them, that it cannot attend without confusion to any thing else, it is so full of that. But what makes me altogether averse from your Hypothesis is, that it seems to import that death causing the greatest alteration that can happen to a Spirit united with Matter, it would likewise transmutate it into Matter, and dissolve it with the other parts of the Body.

Do you not conceive, answer'd my invisible Master, that Spirits are active; especially such as are free from the incumbrance that Matter puts to motion: That this activity is limited, and therefore that it can be encreas'd or diminish'd: That a Spirit, for instance, who can successively contemplate 500 Idea's in an hour, might have a distinct notion of a thousand, if God were pleas'd to increase his power so far. This you cannot deny, since your self can improve the faculties of your Soul by exercise and industry. What you say, that a great noise or sudden amazement do not change the properties of the Soul, is not absolutely true: for they do impair your faculties, so far, that after the action is ceas'd, you remain a certain time as stupefy'd, and recover your self but by-degrees: which is a certain sign that the Soul is indued with certain degrees of activity capable of increase and decrease: for that this benumbing is not a plenitude, but a real suspension of the faculties of the Soul, appears by that, that Sounds, Amazeiments, and the like, do well produce at first some confused Idea; but if they continue, the Soul remains as
unactive;

unactive; because the Objects, that make an impression upon it, are not proportion'd to its faculties. Now let's suppose that a certain degree of Amazement benums the Soul for an hour, if you multiply the Amazement, you will multiply the benumbing, and at last conceive the Amazement so great, that the Soul may be benum'd, or remain unactive many Ages.

As to what you object, that no just consequence may be drawn from the actions and passions of your Soul united with your Body, to the nature and properties of a Spirit free from Matter. I answer, that the difference between both is indeed very great; but that I am forc'd to use such comparisons, because you have not an immediate Idea of meer intelligent Beings; but that you come to the knowledge of them by the reflexions you make upon your own Soul.

As to the fear you have, that your Soul should be by death transmuted again into a Body; there is no occasion for it: because it has past its tryal, and is then to enter into an eternal state of happiness or misery.

Give me leave, said I, to offer yet a difficulty. It seems to follow out of your hypothesis that there are no real Bodies: for what you call'd at first a transmutation is now but a benumbing of the disobedient Spirits, or a cessation of their operations. How different soever intellectual and corporeal extension may be, yet when all is done, according to you, Spirits are extended as well as Bodies: Indeed Spirits are active, penetrable, and thinking; but some of 'em offending God, became by a sudden benumbing unactive, impenetrable and senseless. Why may not the benumbing cease, and they be restor'd to their former activity, penetrability and consciousness?

Not only that may be, answered the Spirit, but it seems that it shall be so. Have you ever read a tolerable explication of that famous passage. *Rom. viii. 19, 23.* The literal Criticks, unacquainted with the ancient Tradition to which *S. Paul* alludes, have so punctuated his words, that they are unintelligible; but read them without the distinction of Comma's, Points and Verses, as they were written at first, and you will find this sense in them. *The Creation, or the Creatures, long with an earnest desire after the revelation of the sons of God; for the Creatures have been made insignificant and trifling, not so much by their own fault, as by the malice of him who has made them obnoxious to it. However, in hope that the Creation it self shall be rescued from the slavery of the corruption, and be put into the glorious liberty of the Children of God. For we know that the whole Creation hitherto sighs, and is a woman in labour. Not only the insensible creatures, but they also who*
have

have receiv'd the first fruits, or the earnest of the Spirit, even we ourselves groan within ourselves, waiting for the adoption, the redemption of our Bodies, that glorious day where we shall be taken into the family of God, and endued with a Spiritual Body. For there shall come a day, when this material and insensible World, shall be made spiritual and sensible to glorifie God in all its parts.

This is the worst of all, said I, for it does not agree with the common Idea that the Christians have of the Resurrection. What Idea, reply'd the Spirit? a gross and carnal notion, that has made so many Atheists, by mingling the reveal'd truths with the phantasms of humane Imagination. Read over again the xvth of the first Epistle to the *Corinthians*, and comparing it with this System, your doubts will easily be clear'd. For my time comes near, and I cannot stay to solve this difficulty, nor to answer some other questions relating to this subject, as why the seducing Spirits were not transmutated into Matter as well as the seduc'd? Whence come the Spirits that now animate living Creatures? Whether they are out of the number of the transmutated, which being releas'd from their prison, are sent into Bodies to undergo a new trial? What becomes of them after the death of their Machines? Besides, what I have said suffices to shew the possibility of this hypothesis, and therefore I shall but add some few considerations to prove it by direct Arguments.

Job 38.
4, 7.

That Spirits have been created before Bodies, appears by Gods own testimony, who to abate the pride of *Job* asks him, *Where he was when he laid the foundation of the Earth*——when the *Morning-Stars* sang together, or rather, when the *Stars* sang together in the morning of the Creation, and all the *Sons of God* shouted for joy. For tho the plural of *וכב* *Star* be here in a construct position *כוכבי בקר* to *stars of the morning*; yet as there is but one *Morning-Star*, which bears the name of *ללה*, and that it would be very improper to call the material *Stars* *בני אלהים* the *Sons of God*, or to ascribe joy and shouting to them; so 'tis evident that by these *Stars* and *Sons of God* are to be understood the *Angels* that persisted in their duty, who rejoyc'd that in spite of *Lucifer*, God should dispose the confused Chaos of the transmutated Spirits into this beautiful World, wherein part of their seduced Brethren should undergo new Trials, and be restored to their former activity, penetrability, knowledge and happiness, if they were obedient to Gods Laws.

But the Apostle to the *Hebrews* is yet more express. *Through faith,* says he, *we understand that the Ages or Worlds were framed by the word of God, so that the visible objects were made out of the invisible;* *εἰς τὸ ἀμὴ φαινόμενον τὰ βλεπόμενα γεγονέναι*, for so the words ought to be read,

March, 1693.

81

as they are in one of *Curcellæus's* readings, and not *εἰς τὸ μὴ ἐκ-
φαινόμενον*, which is not so good Grammar, tho it is all one as to
the sense. Now what are these *invisible* things, these *μὴ φαινόμενα*,
out of which this visible World was made, *γέγονε*, or as another
reading has *ἐποίησε*: According to the common system, before the
creation of Matter, there was nothing but God, whose essence is im-
mutable, and cannot be the pre-existent subject of Bodies. Some
will grant, that Angels were produc'd a short time before Matter;
but then you must suppose that some of those Spirits were transmu-
rated into Matter, if you will conceive how *visible objects were made
out of invisible*.

Here the Spirit renew'd his exhortations of publishing this my-
stery, adding, that tho I were not at present sensible of its extraor-
dinary usefulness, I might be hereafter; threatening me besides with
the punishment due to those who despise spiritual light, and detain
the truth in an unjust silence. Then he vanished, and I found my
self really awake, and in the dark; but to my great comfort, the
natural day began to break soon after.

March, 8.

LET-

LETTER XII.

ARGUMENT.

Why some places of these Memoirs are not understood by the least thinking sort. Curious questions resolved by the man that traces out Robbers and Murtherers. New Tryals made about it. That they cannot be explain'd by the subtil Matter of Descartes. That the Steams of Metals are not viscous. That the effluvioms of Murtherers are a poyson for people of this Peasant's constitution. That a thorough Repentance in the Criminals changes the nature of their effluvioms. That the emanations of simple Robbers are not venemous. That the Rotation of the Wand does not immediately proceed from these Steams. Veins of Metals traced out this Way. A curious Exppriment about it explained.

I Had taken so much care and circumspection in publishing the Relation of that *French Country-man*, who traces out Murtherers by their Footsteps, that I might reasonably suppose no man of Sense would contest the matter of Fact; and it has so far succeeded, that I perceive the greatest part of the Ingenious with whom I am acquainted are perswaded of it. However, as there are men, who rather than to believe what their shallow conceptions cannot reach unto, deny or wrest the plainest passages of the Holy Scripture; so, I am not at all surpriz'd that one of the proudest and most insignificant of that tribe have written to me, that I have given a story of a Discoverer, but no authority to back it: tho I have described the man, the place and witnesses, by all the possible circumstances. But this is not to be wonder'd from one, who judging of others by himself, thinks that I write chiefly upon mercenary considerations, and therefore advises me to make my Book sell by an even hand, and not to write such things, at whose sense there is no coming without great digging. Indeed, says he, learned men who are not the wisest or best judgments, may like the language or words or notions: but the reason is buried to men of good judgments and no great learning, which are your Customers, or most in number. Let it be how it will,

will, it's my Bookseller's care to get Customers, and not mine, who am altogether unconcerned in the Sale. Besides this Gentleman, as uncharitable as he is, might well have guessed that I am not so great a stranger in the world, as not to know that of all the Subjects I could chuse, those of which these Memoirs are to be compos'd are the least taking with the Vulgar. And that if I designed any thing like getting an Estate by the writing of Books, I would make choice of a Matter more suitable to my ends.

But enough of this. The matter of Fact is so little doubted in France, that the learned there are about explaining this surprizing Phenomenon. Mr de Vallemont a Doctor of Divinity of Paris has a Treatise under the Press concerning this subject, which will not fail to answer the expectation of the world, if we may judge of it by his Description of the Loadstone that was lately formed on the Steeple of our Ladies Church at Chartres, and his curious observations upon it. Printed at Paris in 12°. 1692. I have just now seen two Discourses concerning this Discoverer, composed by two Doctors of Physic of the Colledge of Physicians in Lyons, Mr. Garnier and Mr. Chauvin. Both relate the matter of fact as I have done; so that the main must undoubtedly be true. But Mr. Granier adds to it the solution of some questions which he has put himself upon this James Aymar, together with some Tryals that this Country-man has made in his presence, at the House of the Lieutenant-General or Chief Justice of Lyons.

His answers to the questions come to this. 1. That he feels neither pain nor trouble, when he follows the footsteps of Robbers, and seeks for Springs and hidden Treasures: but that he is inwardly and mightily disturbed, when he hunts out murtherers, and endeavours to discover the place whether boundaries of Land have been removed. 2. That therefore he cannot distinguish the source of Fountains from money hidden in the ground, because his wand turns equally upon both. 3. That as to Robbers he can distinguish them, because he cannot hunt them out by their footsteps, unless he begins at the place where the Robbery has been committed. 4. That is is the same with Murtherers, but that he discerns them from Robbers, by the inward disturbance he feels in tracing out the former. 5. That different Murthers produce in him different commotions, which vary in degrees of strength and power upon him. 6. That if in his hunting out of a Robber or Murtherer, he chanced to come on the footsteps of another, he would not be affected, nor his wand turn on the way by which this second Robber or Murtherer had passed: because the search must begin at the place where the fact has

been perpetrated. 7. That he is sensible of the number of the Accomplices, provided they do not all pass in one and the same Path. 8. That it ordinarily happens that his wand remains motionless upon a Murtherer, who has confessed his crime, but that this is neither certain nor infalible. 9. That the time wherein he may discover a Murther is not fixed nor limited, and that the first he found out had been perpetrated twenty years before. 10. That his Wand does not turn upon a body that has been bury'd, or a man that dy'd a natural death. 11. That the Bishop of *S. John de Morienne* in *Savoy*, has the same gift that he has.

The Tryals made in our *Author's* presence are chiefly the following. *Aymar* cut a forked stick out of the first broom he met with, and took it so at both ends with his two hands, that the least motion was able to make it turn. Then having put three Crowns under his right foot, the Wand turn'd, and the more Money they put under it, the swifter was the motion. Afterwards they plac'd several Hats on the Table of the *Lieutenant General's* Library, and without the Peasant's knowledge some Silver-money was hidden under some of 'em: *Aymar* having put one of his Legs on the foot of the Table, apply'd his hands holding the Wand at the several Hats, and the Wand was seen to turn upon them under which the Money laid, and not upon the others.

To try his skill as to Robbers, the *Lieutenant General's* Lady took the Purse of one of the company, and then they told him that there was a Thief amongst 'em; he put his foot upon one of the feet of the several persons that were in the Room, and the Wand remaining motionless, he affirmed that there was none. However, say they, a Theft has been just now committed here: No, answer'd he, 'twas but for sport; and if any thing has been stoln here, 'tis with intention to restore it again.

A Lackey of the *Lieutenant General* had robb'd him to the value of about 25 Crowns, 8 months before: Our Peasant being brought to the place where the Theft had been committed, shew'd the Drawer whence the Lackey had taken the Money, the places whether he had gone, and the Bed wherein he had laid after his crime. As he was thus in quest of him, the Wand turning still, all the Lackeys of the house were brought before to him, he put his foot upon each of theirs, but the Wand became immediately motionless, because none of them was guilty.

It would be easie to explain all these Answers and Tryals by the principles I have laid down in my VI Letter, without having recourse to the subtil Matter of *Descartes*, as do the two Physicians of

Lyons:

Lyons: for besides that this subtil matter has been prov'd a meer figment, it's altogether unserviceable in this occasion: because its least particles being suppos'd soft, flexible and fluid, and to adapt themselves to every sort of figure, cannot cause such violent motions as are Convulsion fits, or the circulary rotation of a Wand, which must needs be produced by rigid and inflexible corpuscles.

(a) See
Lett. x. p.
64, 65.

I have ascrib'd four general qualities to the particles of the *effluvia*, viz. smallness, rigidity, gravity and clamminess: but as to the last property, it must be observ'd that I spoke then of the *effluvia* of living bodies, which having made part of the flesh, blood and humours of these Creatures retain something of their viscosity: Whereas the particles emitted by Metals seem to be smoother, and not to stick so easily, or intangle themselves among the pores through which they pass. And accordingly *Aymar*, having observed that the Sickle, which had been the instrument of the Murther, did not make his Wand turn, when it was wrapt up in a Linnen-cloth, imagined that the same would happen to Money, but he found himself in a mistake.

If what this Country-man says be true, namely, that the first Murther he discover'd had been perpetrated 20 years before, these *effluvia* must needs be suppos'd not only hard, heavy and clammy, but also poysonous to him; for no other bodies but poysons can produce such sensible effects in so little quantity.

I am confirmed in my opinion, that the violent agitation of this horrid crime changes the steams of the Murtherers into a poyson for this Peasant, by what he relates, that sometimes after the criminal's confession, the Wand ceases to move at his presence: which I ascribe to the sincere repentance of the prisoner, that changes the exhalations of his Body, as well as the inward state of his Soul, when he confesses the whole matter, with that horror and detestation that ought to arise from the sense of such an enormous sin: whereas they remain almost the same, if he persist in his obstinacy; or do not ingenuously confess; this perversity being a certain sign that his inward disposition is not wholly altered.

The difference that was found by Tryal betwixt a real and feign'd Theft is likewise a proof, that the inward agitation of sinners changes the constitution of their Bodies. But as to what *Aymar* says, that the *effluvia* of Robbers do not disturb him, I am apt to believe that it must be understood comparatively, that is, they do

not so sensibly affect him as those of Murtherers; as the sin of the former is not near so great as that of the latter. Or perhaps he will say that the motions which the corpuscles of Robbers cause in him are not painful. For if these *effluvioms* did not move him at all, it would not be necessary that it should impregnate himself with them at the place of the Robbery, in order to hunt out those that are guilty of it: whereas Experience has taught him that the discovery could not be performed otherwise.

(a) See
p. 36.

Mr. *Garnier* pretends that the impression of the *effluvioms* upon the Wand are the immediate cause of its rotation. But if it were so, the Wand would turn more or less in every ones hands; whereas it has been observed that it only moves in the hands of such as have the gift of discovering Fountains (a), and that they are all inwardly agitated; whence it is plain, that this agitation contracting the Muscles of the Fingers, which by the extensive virtue of the Nerves, endeavour to return to their former place; these two successive and contrary motions, together with the tender holding of the Wand, are the proper causes of its rotation.

But because instances are the best demonstrations in this kind of things, I shall add here two, which I have from very credible Eye-witnesses. You have undoubtedly seen or at least heard of some Persons, who have a natural aversion for Cats, Rats, or some other Animal. I have seen my self women fall into a Transe at the sudden sight of a Rat, but this may be imputed to the weakness of their imagination, which in their youth had been frightened with stories of these Creatures. However this cannot be said of one, who coming into a Room, where a Cat was, which he neither saw nor knew of, presently turned pale, and in a short time fell into a Swoond, till some body acquainted with this natural antipathy of his, imagined what might be the cause of this sudden fit, sought about and found the Cat under the Cup-board. Such instances, which are not very uncommon, plainly evidence that the effluvioms of some animals, are poysonous as to some Persons, whilst they have no sensible influence upon others. But that even metals as silver emit sufficient steams to affect some living Creatures, appears by this following example.

A Gentleman, who had a strong and well taught Water-Spaniel, walking one day with a Church-man a Friend of his, and seeing two Country-women come up that way, told him he would give him a pleasant sport, to which this Clergy-man yielded, provided there was no harm done. The Gentleman let as unadvisedly fall half a Crown to the ground pursuing still his way: The women coming to the

the place, the nimblest of them did not fail to take up the money; which the Gentleman that was spying them had no sooner perceived, that he called his Dog, and shewing it another half a Crown bad it in his usual manner to go and fetch what he had lost. Away ran the Spaniel right up to the women, whom he passed by a little way, then stop'd, turn'd and star'd about, came back to the women, smel'd at 'em, and took her by the coat who had put the piece of money in her Pocket. The woman defended herself, called to the Gentleman to keep his Dog from her; the sport lasted a while, till the Clergy man fearing for some mischief, came up to the women and told 'em they had found something belonging to the Master of that Spaniel, which if they would restore, it would leave them quiet. They denied it at first, but the Clergy-man telling them that he had seen his friend letting purposely fall half a Crown to try their honesty and the Dog's sagacity, the woman threw down the piece, which the Spaniel took up and carried back to its master, as proud of its victory as a Soldier of his beating the Enemy.

I am not of their number, who make beasts insensible creatures, but should be unwilling to ascribe them a greater portion of reason than to my self; which however must be, if the Spaniel were not directed in its way by the effluvioms of its master, and determined to assault that woman by a greater quantity of those effluvioms joyned with the steams of the half a Crown. Besides that the whole story makes it plain that it made only use of its quick smelling.

For a farther confirmation of the power of the Particles steaming out of metals, I would have quoted some passages out of *Bonfinius*, who, if I remember well, testifies that in *Hungary* Gold, Silver and Copper-mines are sought for and discovered by the means of a wand of this kind; but not having the Book by me, I was going to conclude this Letter, when a friend sent me word, that a worthy Gentleman, Fellow of the Royal Society, had seen himself several experiments of this nature, during his stay in *Germany*. He has always been a great Engineer, especially to draw waters out Mines, for which he has contrived divers curious Engines. And as he understands Chymistry and the ordering of Metals, he was sent for by the Elector of *Saxony* to drain some Mines there, which gave him the occasion to try many Experiments about this wand, that is much used in that Country, to trace out the veins of Copper and the like. He has had a man with him, who carried one of these Wands a whole day, and when he crossed a Vein, the Wand would strike upon it. One passage, adds my friend, I could not but take notice of, that one in the company took the Wand out of the mans hand, and gave him another,

ther, which he could use as well, but when the man did not see him, he laid the Wand he had formerly used upon the Vein, whereupon that in his hand became useless, and he could not find the Vein again, till it was taken away.

This last Phænomenon is indeed very surprizing. Perhaps it might be said that the effluviūms of the man joyn'd with the steams of the metals, had chang'd so far the figure of the pores in the former Wand, by their frequent passage through them, as to find still admittance thereinto, tho they could not so easily get out, as when the man held it in his hands, their course being then facilitated by the motion of his fingers. So that when this Wand was set upon the Vein, there did not arise a sufficient quantity of Metallick steams to move the latter Wand, which he held then in his hands. Or perhaps, they went out of the former Wand in a sense that rendred them incapable of entring into the latter. As we see that the magnetical effluviūms coming out of one pole of the Load-stone draw the Mariners Needle, or filings of Iron, and drive them away, coming out of the opposite pole; or as a Knife rubbed against a Load-stone will hold small Needles suspended, but loses presently its vertue, if it be touched with it in a contrary sense.

March 16.

LETTER XIII.

To the Honourable Sir Edwin Sadler.

ARGUMENT.

A Commendation of Descartes, why the Author does not follow all his Opinions? Questions that may be made about the original of Light and Colours. Descartes's System of the World, on which his Explication of Light and Colours depend. What one who proposes New Hypotheses ought to observe. His Suppositions examined concerning the infinite extension of Matter, the Quantity of Motion, the Material Vortexes, whose Formation and Duration are demonstrated impossible; and inconsistent with the course of the Comets and Planets.

There are few persons who have a greater veneration for Descartes than I have. His neat and perspicuous style, his well adapted comparisons

comparisons, his plain way of arguing, are so taking with me, that had I been his contemporary, I should have been one of his most zealous abettors. But being born in a time, when *Peripatetism* was derided, and having learned the elements of Philosophy in the Books of *Descartes* and of his Disciples, the necessity they urge of freeing our selves of prejudices, made such a strong impression upon me, that examining their own Writings by that rule, I came to suspect many things which a Magisterial air would have impos'd upon me. According as I proceeded in my Meditations and Studies, these suspicions began to increase and to grow into formal doubts; and ever since, I have examin'd few particular heads of *Descartes's* Metaphysics and Physics, wherein my notions agreed altogether with his. I hope, Sir, you'll do me the justice to believe that this does not come from any affectation, or spirit of contradiction, but from an earnest desire of finding out the truth; to which if I can ever attain, I shall freely and thankfully own that this famous Philosopher traced out the way to me.

The original cause of Light, of which we spake lately, is one of the most abstruse *Phænomena* in Natural Philosophy. We hardly know any thing more of it but that the Sun and Stars in Heaven, and Fire on Earth, are the efficient causes of Light, the Air, transparent and pervious bodies, the *Mediums* through which it is communicated to us with different refractions, and solid bodies that which reflect it to our Eyes endu'd with several colours. If the Ingenious had been content with this plain and certain knowledge, and made it their chief care to know the several degrees of reflection and refraction, and how they may be modify'd and apply'd to the uses of humane life; they might have improv'd farther the Science of *Opticks*, or render'd it more common. But remote speculations seem to be so noble, and are for this reason so taking with Philosophers, that endeavouring to penetrate into the nature of Light, they have obscur'd and perplex'd it with almost unanswerable questions, as 1. Whether the light of the Sun and Stars proceed from effluvioms of these luminous bodies, or from their action on the *Æther*, and thence on our Eyes? 2. Whether this action be momentaneous or successive? 3. Whether the colours arising from the various reflections of Light are in the objects themselves as they appear to be, or whether they are only different sensations of our Soul, occasioned by the various texture of solid bodies? 4. Whether objects emit little images like themselves, which penetrate to the sensory through the pores of the Eye? or whether these images are formed on the *retine* or reticular tunicle of the Eye; by rays of Light coming from each point

point of the object, and uniting on the said Tunicle? The third and fourth questions are not problematic any more, the endeavors of modern Philosophers having been pretty successful in demonstrating the latter part of them to be true: But as to the first question, tho *Descartes* have taken four or five times (a) this matter in hand, and that he seem'd so well satisfy'd with his principles, that he never thought of making any change in them, notwithstanding all the objections that were made to him; yet I never had the happiness to perceive the reasons of his strong persuasion; unless it were that looking upon his explication of light, as a natural and necessary consequence of his System of the World; he thought it would shake and endanger the whole building, to take out or change such a mighty Corner-stone.

(a) *Princ. Philos.* p. 3. n. 55. & *Dioptr.* c. 1. & 2. *Met.* c. 7, 8, 9 & 10. *Epist.* 1. 1. *Ep.* 56, 59, 62, 204.

(b) *Princ.* p. 3. n. 76.

He supposes (b) that God created an indefinite mass of Matter, that is, so great that it cannot be conceiv'd greater; That he divided it into several equal parts; That he imprinted on them as much motion as there is now in the World: That these parts were determined to move round about as many Vortexes as there are fixed Stars besides the Sun and Planets: That they made them altogether an indefinite fluid mass, as the Heaven is thought to be: That by the continuance of this circular motion, the parts of the divided Matter came to break their corners in rubbing one against another; whence arose at first a most subtil dust, which he calls the subtil Matter, or the first Element; secondly, thence came small globules, which are the Celestial Matter, and his second Element; thirdly, but other remain'd irregular and of various figures, to make up his third Element, his *Materia Striata*, his channel'd and scooped Matter.

(b) *Ibid.* n. 52.

(d) *Ibid.* n. 54.

As according to him, there neither is nor can be any void space in the World, (b) the first Element is happily so much agitated, that meeting with other bodies, it comes to be divided into Particles of an indefinite smallness, so that it is able to fit it self immediately to all the figures of the interstices, which the round or unequal superficies of the other Elements leave amongst 'em. The first Element (c) was mightily encreas'd by the Transmutation of a great part of the second into it; for tho the celestial Globules be already so small, that they may be called insensible, in comparison of the gross bodies we are conversant with; yet this may be still divided, and part of them were really so, if we believe our Philosopher; so that there being subtil matter over and above what was necessary to fill up the cavities left betwixt the Globules and the corners of the channelled Particles, the overplus flowed to the center of the Vortexes, to form

form there those round and luminous bodies, which we call Sun and Stars.

(d) And as by a law of Nature, all the bodies, which are moved in round, have a tendency to remove from the center of their motion; so the Particles of the subtil matter that make up the Sun and Stars, moving circularly, and endeavoring to escape by a tangent line, at each point of the circumference they describe, press upon the globules of the celestial matter, that turn round about it, with the same tendency of removing from the center of their motion, and these globules press again upon the optick Nerves, as tho they were so many straight and rigid rods reaching from the Sun or Star to our Ey's. So that we perceive objects by the sight, (a) much about the same manner that a blind man discerns the bodies that surround him, by the different resistance they make to his stick, which resistance is immediately communicated to his hand, and thence to the sensory.

(d) n. 55.
61.

(a) *Dioptr.*
c. 1. n. 2,
3.

Its but just to allow Philosophers to invent Hypotheses, since the true causes of natural effects being most part unknown, they can only be discovered by comparing, with a fictitious cause, several effects we are acquainted with. But as in Arithmetick, to find out the required Number by the rule of false position, you must not suppose any other that is not within the limits in which the number sought for is included; so in Physics, if your Hypotheses are not true, they ought first to be probable, and not to contradict any natural Laws or common Notions. Secondly, You are not to suppose any thing contrary to what you have granted, or supposed before; otherwise your System will not be coherent, and your Adversaries will expose you. Thirdly, You must not pretend to pay your Readers with words and comparisons, for in this nice and critical age they expect real proofs of whatever you shall advance, and even as strong as the matter will bear.

To find out an Hypothesis by which the formation of the world, and its principal Phenomena may be explained, and to confine one's self in the mean while to the forementioned rules, is perhaps more difficult than can be imagined; and I might hope to bring the most incredulous, to the belief of this truth, if I shewed that even the *Cartesian* Hypothesis falls very short of the observation of these maxims.

I shall not here repeat the reasons I have alledged in my third Letter, against the infinite extension of matter, nor prove again that motion is impossible, the World being supposed infinite: but only observe, that *Descartes* does not avoid these objections by calling it

N

indefi-

indefinite; for what is no more than indefinite or indeterminate, is only so in reference to us, because we do not know the end of it, but in it self it must be either finite or infinite, there being no *medium* between both.

And that our Philosopher has conceived the World really infinite, appears, 1. by his confounding the notions of space, extension and matter; Now that we have an Idea of an infinite space has been plainly demonstrated, and can hardly be denied by any one who makes attention upon himself. 2. The *Cartesian* System does necessarily require infinity in matter; for matter being fluid and determined to move round about the center of each Vortex, and yet having a natural tendency to remove from the center of its motion, at every point of the circumference it describes; the Vortexes would soon be broken and confounded, and the World become a new Chaos, if the matter which they are made of was not kept within its limits by an infinite resistance, or if there was any void space or extension, wherein they might overflow. And *Descartes* himself confesses so much, when he says, that *he holds matter to be indefinite, lest a place might be supposed, whether the particles of his Vortexes might escape.* Epist. P. 1. Ep. 67.

Thus the difficulties that attend motion in this system fall as heavy upon the master as upon the Disciples, since after many tergiversations, he is forc'd to own a real infinity in matter. And therefore it is impossible that God should have divided it into several equal parts, as his second supposition runs, since at any point soever this division be supposed to begin, it would meet every where with an infinite resistance, or incapacity of motion, and consequently no real division be made, the action of the infinite power being counterbalanced by the infinite resistance that matter would make, if it had no room to store.

His second supposition, that the same quantity of motion which God imprinted at first on matter, is continued to this very day without any diminution or increase, notwithstanding the several ways by which this motion is communicated to the several parts of matter; this supposition, I say, is no less contrary to reason and experience. To reason, for *Descartes* admits the existence of Spirits, and their power of moving matter (a). Now suppose a Spirit beginning to move circularly a certain quantity of matter, that was before in rest, or not near so swiftly moved, I asked where was that motion before it begun? from what bodies did it come? or to what bodies does it pass, when the impression of the Spirit ceases, for we suppose that it moves circularly or within it self, and that it only
subsists

(a) P. 1.
Ep. 69.

subsists by the action and will of the moving Spirit. Now 'tis plain that the same quantity of motion cannot be preserved in the world, unless it passes successively from one body to another, and that one loses as much of its motion as the other acquires, as *Descartes* ^{(b) Ibid. Ep. 72.} himself owns. But in the instance of a Spirit moving circularly a portion of matter, the motion begins and ends in the same Subject, and is by consequence a new mode or accident that was not before in the world.

His Disciples will not rid themselves of this difficulty, by denying to finite Spirits the power of moving matter, against their own consciousness and experience, since they grant that God moves bodies at the desire of Spirits. For if a Spirit will the motion of a body in rest, or a sensible increase of its motion, this body must necessarily be moved or its motion increased, tho neither the motion nor the new degree of motion be communicated to it by any other body. Whence it follows that to preserve still the same quantity of motion in the world, the *Cartesians* must suppose that all the Spirits, tho they be never so free, cannot do so much as to will the existence of a new degree of motion.

But without having recourse to the will or power of Spirits, we have several instances of bodies communicating a strong motion to others, or rather occasioning it in them, without losing any considerable part of their own: As it happens in calm weather to a little Wind-mill rais'd upon an axis of well polished Steel on the top of a Tower, when the Bullet of a Musket discharged in the air chances to glance but in passing at the end of one of its Sails; for the Bullet will lose almost nothing of its motion, and pursue his way as far and as quick, as if it had not touched the Wind-mill, tho this slight and oblique impression causes the Wind-mill to twirl for a considerable time.

The allegation of the immutability of God is here besides the purpose: for his immutability in this respect, does consist in his preserving or continuing to will the being of the substances that he created at first; which is one of the firmest Arguments we have for the immortality of our Souls, and the resurrection of our Bodies. But this Divine attribute has no relation to accidents, modes or manners of being such as motion is, which are so far from being immutable, that they change every moment. Nay 'tis in these very changes, that the inexhaustible Treasures of his infinite Wisdom are most apparent.

Perhaps you will say that this is only a small mistake, which does not reach the main body of *Descartes's* system: but, Sir, this ground-

(a) P. 1.
Ep. 69.

less Axiom is one of the chief props of it, that hinders it from an intire subversion; for the globules of the celestial Matter rubbing incessantly against one another, do perpetually increase the quantity of the subtil Matter: So that were it not for this equality of motion, all the World would soon turn into a flame (a), or be consumed by it: but by vertue of this pretended unchangeable rule, proportionably as motion increaseth in one place, it diminishes in another, the subtil Matter being transmuted into the third Element, and this afterwards into the second.

Hitherto our Philosopher has been very unsuccessful in his suppositions, but the greatest mischief is, that his dearly beloved Vortexes are improbable as to their formation, impossible as to their duration or long continuance, and inconsistent with Astronomical observations and natural effects.

To shew that the formation of the Vortexes of *Descartes* is altogether improbable, we need but remember that he supposes God divided at first the Matter of the World, indefinitely extended, into several equal parts, not so big as the particles of the third Element, but not so small as the globules of the second: That he imprinted on each of them an equal degree of motion, and determined them to move each separately about its own center (a), *equaliter fuisse motas, tum singulas circa propria sua centra, & separatim a se mutuo, ita ut corpus fluidum componerent, quale cœlum esse putamus.* If this great man had a distinct idea of his supposition, he must have conceiv'd that the first division of Matter was into several little squares, as are here,

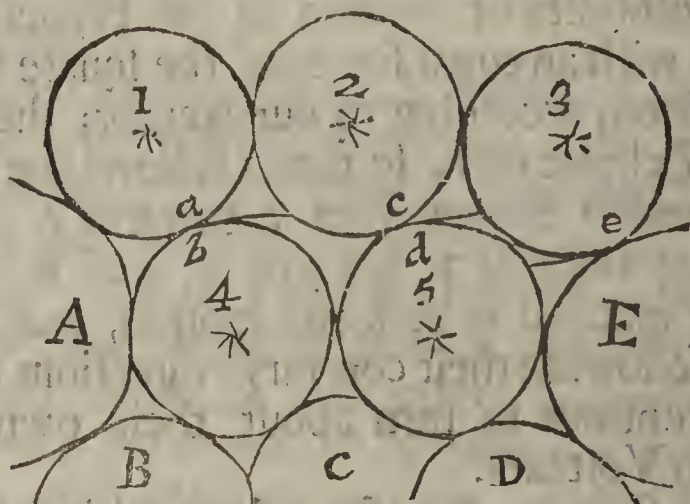
b a 1 c d	f g 2 e h	3	4
1 m 5 k i	o n 6 p q	7	8
9	s t 10 r u	11	12
13	14	15	16

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16: for it could not be divided at first into globules, nor into irregular polygons, which would have left void spaces amongst 'em: besides that the corners of these particles were to be broken, to make up the subtil, and then the channell'd Matter: in order to which the square figure was the most proper of all. Now, not to object again that motion is impossible in this Hypothesis: because the Square 10 for instance, to move round about its center according to the order of the Letters, *r, s, t, u*, must drive away the squares 11, 7, 6, 5, 9, 13, 14, 15, which however are not allow'd the least imaginable room to remove backwards, each of them being underpropt and maintain'd in its own place by an infinite number of others: Notwithstanding this, let's grant him the possibility of motion in his Hypothesis; since the square 1 moves with an equal force as the square 2, but both with a contrary direction, according to our Author; the Poles of 1 being opposite to the Ecliptic of 2, so that 1 follows the order of the Letters *a, b, c, d*, and 2 moves from *e* towards *f, g, h*, I say that 1 shall never get any thing of 2, nor 3 of 4, 5 of 6, 7 of 8, &c. since they are equally match'd in bulk and motion, and endued with an equal force of following their contrary directions: And therefore they shall still continue to turn about their own center, without ever uniting into Vortexes.

But let's suppose again that after a long rubbing of these particles one against another, such Vortexes may be formed, not so much however by the *Cartesian* Laws of motion, as by the power of God Almighty: Why should the subtil matter, the thinnest and most agitated of all, fall down to the Center of the Vortex? For how small soever the body of the first squares grew by that perpetual crumbling, yet the remaining Globules were still bigger and heavier, and had therefore less power to remove from the Center, than that fine powder and thin filings, which were scrap'd off from the superficies of the squares; so that these Globules ought to have fallen down to the center together with the thickest filings, and perhaps some few particles of subtil matter interwoven in and amongst their pores. Whence it follows that had the Sun and Stars been formed that way, they would be a confus'd hoard of gross particles, instead of a heap of subtil matter, and thus be dark instead of luminous.

This will methinks suffice to shew the improbability, if not the absurdity of the Vortexes of *Descartes*. But let us be as kind as possible, and allow him to form his World just as he pleases, provided we have the liberty of comparing his fabrick with the magnificent

ficent and unshakeable structure of the real Universe. The Vortexes are as many Ellipses, whereof a Star is the center or navel: but since all matter moving circularly has a tendency to remove from the center of its motion, what is it that keeps the utmost parts, moving in the circumference of these Ellipses, from escaping by tangent lines? He must needs say one of these two, either that each of his Vortexes is infinitely extended, or that they are hindred from going astray by the pressure of the contiguous Vortexes. As to the first, I am not so quick-sighted as to conceive how a figure terminated on all sides, as an Ellipsis is, can be infinitely extended. And as to the second, it will not serve his turn neither: for suppose



the Ovals 1, 2, 3, 4, 5, to be Vortexes touching immediately one another, at as many points as they can; A B C D E to be part of other Vortexes *in infinitum*: Since the figure, of these Ellipses will not allow them to touch one another at all the points of the circumference, and that they must necessarily leave spaces amongst them, I ask with what sort of Matter these spaces are fill'd, and whether it is quiescent or moving? If the first, since Matter of itself is indifferent to rest or motion, and that a body in rest cannot resist another in motion which strikes it, according to the Cartesian Principles; the celestial Matter of * 1 being arrived at *a*, and meeting with no resistance, must necessarily by the propensity it has of removing from the center deviate into the space betwixt 4, 5, 2, and describing a tangent line make an irruption in to * 2 over against *c*, which unhappiness the * 2 can the least avoid, that the stars 1 and 4 invade his vortex with a conjoint force from the points *a* and *b*; but to its great comfort, it may compensate its losses with an irruption into * 3, making a confederacy with * 5, and invading conjointly the vortex 3 by the tangent *c, d*.

Thus

Thus the Vortexes of *Descartes* would soon ruin and swallow up one another, and his matching them with an equal force is a supposition as unprofitable as it is groundless, because two of them joining against one must necessarily over-power it. Neither will it help him to fill up these spaces with an agitated matter; for then this motion shall be equal to that of the celestial matter endeavouring to escape from 1 and 4 by the tangent *a, b*; or it shall be greater or lesser. Equal it cannot be, because the bulk and quantity and consequently the power of the celestial matter coming from 1 and 4 surpasses by far that of the Matter contained in the space betwixt 1, 4, 5, 2; which tho it had been at first as much agitated as the globules of the second Element, must have lost a great deal of its motion by the oblique way it is forc'd to run among these four Vortexes: So that its motion not being able to oppose that of the tangent *a, b*, it will only serve to increase it, and make a stronger irruption into * 2.

It seems at first a pertinent answer to say that the Vortexes turn about their center with contrary directions, so that two of them cannot joyn to annoy a third; but it's to be observed that there is always three Vortexes and more, which touch one another immediately, whereas there are but two directions diametrically opposite, viz. North and South, East and West: So that if the Stars 1 and 4 cannot unite against the * 2, the Stars 1 and 2 may joyn against the * 4, &c. And it must be by some such means that the small squares, into which the *Cartesian* Matter was divided at first, were conglobated into Vortexes; so that here is no way to escape, and *Descartes* must either own the formation of his Vortexes to be impossible, or confess that they may be as easily dissolved, as congregated.

The difficulty will still increase, if he suppose that all his Vortexes do not describe circular or parabolical Orbs, but such irregular Polygons as are necessary to take up all the spaces that would otherwise interceed amongst 'em; for as some figures such as Spheres, Cylinders and Eclipses are more proper for motion than others; and as in bodies made of parts variously figured, some are bigger and consequently stronger than the rest; the biggest, strongest, and swiftest Vortexes will break the corners of the smallest, weakest, and slowest, and growing every day by their spoils, devour at last all the others.

Thus, Sir, you see that to what side soever our Philosopher turns himself, those celestial lamps, which Poets with the consent of mankind have called eternal Lamps, will be in his system, of a very short and uncertain standing; and that the dissolution of a star is not
differr'd

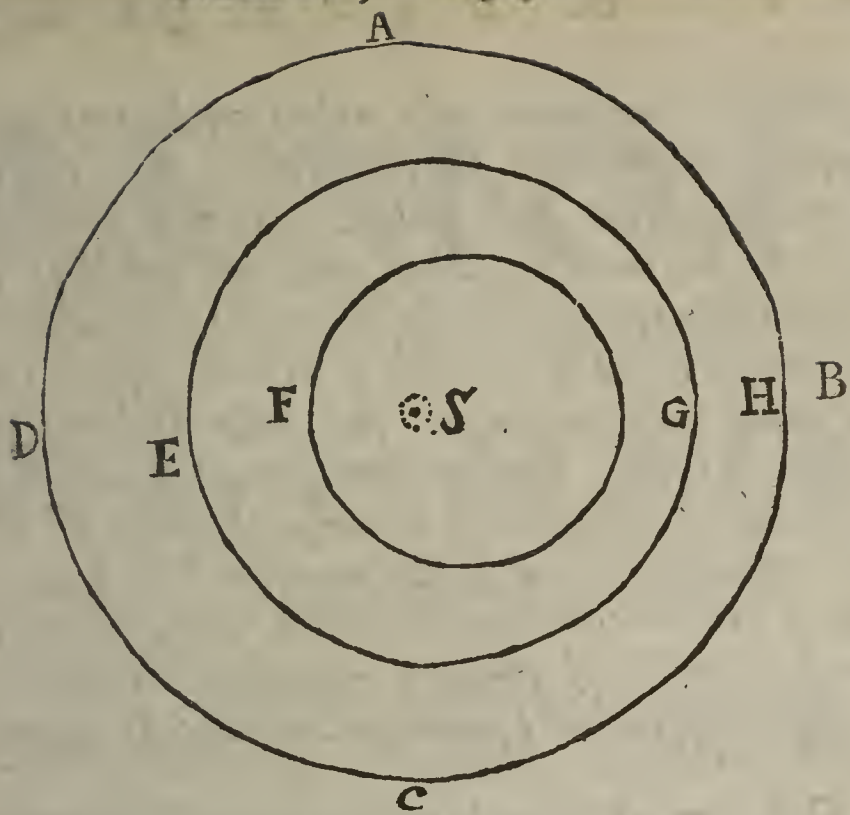
differr'd till the subtil matter condenses into large spots upon its luminous body, since it can be destroyed at any time, by the neighbouring Vortexes; especially, when two of them, conspiring together, emit their Globules in a direct line as a Canon shot against it. So that it's hard to conceive in the *Cartesian* hypothesis why all the stars should not be turned by this time into Planets or Comets, except one or two, which having proved stronger than the rest, should now rule over all the Heavens.

a) Prin.
P. 3. n. 116.
to 121. &
126 to
130.

I am now to shew the inconsistency of these Vortexes with Astronomical observations. It seems our Philosopher foresaw that the rising and irregular course of the Comets would prove one day or other the destruction of his World. And therefore he wisely placed them among the fixed Stars. But that would not help, for the Comets (a) are so troublesome, as to run across of all his Vortexes, swiftly passing from one into another, till they vanish out of our sight, and go I know not whether. However I admire the consideration that these insensible things have for our Philosopher's World; tho the Vortexes be fluid, and the Comets solid bodies, nay so big that they themselves have been no inconsiderable Stars, before they were unhappily turn'd into that heavy mass; tho in their crossing these fluid Vortexes, they carry a great deal of their globules along with them; yet so civil they are, that at their entrance into a new Vortex, they leave at the door all the particles of the Vortex whence they come, lest they should disturb the mighty fabrick of the *Cartesian* system. Really Sir, I may as soon believe the Fables of the Gyants scaling the Heavens, as to look upon such fopperies as the true causes of natural effects.

Hitherto I have confuted *Descartes* by himself, now I shall oppose him the best Astronomers of this age, *English, Italian, German, and French, &c.* They all agree that the Planets turn in so many Ellipses, of which the Sun is the *focus*; the reason of it is, that they are observed to be, in some points called *Perihelia*, nearer to the Sun, and, in the opposite points call'd *Aphelia*, farther from it; which could not be, if they mov'd in a perfect circle. They add to this that the Planets by beams drawn to the Sun describe Planes that are proportional in time. Whence 'tis easy to infer that they are not wheel'd about by material Vortexes. For

March, 1673.



let ABCD be a perfect circle, representing the utmost bounds of the Solary Vortex, E, F, G, H, two Ellipses of which S is the Navel, both representing the Vortexes of two Planets turning about the Sun; EF their *Perihelia*, and GH their *Aphelia*. The Planes that they really describe in reference to the Sun are proportional in me, so that they never go swifter nor slower, tho it appears sometimes otherwise to us, by reason of the motion of the Earth: but if they were carried about by corporeal Vortexes, they ought by the Astronomical Laws, to move swifter in their *Perihelia* than in their *Aphelia*, the celestial matter being more agitated and dilated when it is nearest to the Sun, than when it is at the farthest distance from it; which however does not prove true. And yet for a more perfect contradiction, it happens just that the extremities of the pretended Vortexes are nearer to one another in the *Aphelia* of the Planets, as at GH, than in their *Perihelia* as at EF; but the celestial Matter is a fluid, and by the Mechanical Laws the more fluids are pressed the swifter they run; so that the Matter of these pretended Vortexes ought to move swifter in the two opposite places, viz. in their *Aphelia* by the Laws of Mechanicks, and in their *Perihelia* by the Laws of Astronomy, than which nothing can be more absurd.

It remains that I should shew the inconsistency of *Descartes's* System with other Phenomena: but this Letter being already very long, I hope, Sir, that you will excuse me, if I defer it to another occasion.

March, 25th.

F I N I S.

ADVERTISEMENT.

That troublesome Gentleman, who writes me Letters every Month, and is so importunate with me for an answer, shall find himself remember'd at the beginning of the XII. Letter. He may judge by that, that he is like to receive no better satisfaction until he publishes his objections in Print: for it would be too fencing-like to confute private Letters, which are neither subscribed nor owned by any body of repute, especially when they are so far from being worth taking notice of; that their Author seems to want good breeding and common sense. Let him then appear in publick, if he have any Wit or Honesty; for whatsoever may be the real worth of these Memoirs, it will be more creditable for him solidly to confute such places as he dislikes, than to use secret endeavors to cry them down, and discourage the Undertakers. Perhaps he is affraid I shall not vouchsafe to return him an Answer, and indeed it might happen that I should be unwilling to enter the Lists with one.

Qui cum victus erit mecum certasse feretur.

Well then let him use his own discretion, or rather, if he be wise, the advice of a Friend.

E R R A T A in February.

Page 39. in the Margin, Roquet. read Rodet. p. 57. l. 17. superseded from. so r. superseded so.

The CONTENTS.

Letter. XI. *The Creation of an Indefinite Number of Spirits. The Conspiracy of Lucifer and his Accomplices. The Seduction and Disobedience of the Inferior Spiiits; their Transmutation into the Matter of the Universe.* 67

Letter XII. *Curious Observations on the Man that traces out Murtherers and Robbers, and finds out hidden Money, by the Motion of his Wand. Instances of others, who can discover Mines of Metals, the same Way.* 82

Letter XIII. *The Vortexes of Descartes considered, and their Inconsistency with his own Principles and Astronmical Phænomena demonstrated.* 88

MEMOIRS FOR THE INGENIOUS.

CONTAINING

Several Curious Observations in *Philosophy,*
Mathematicks, Physick, History, Philology, and
other Arts and Sciences.

IN

Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

A P R I L, 1693.

To be continued Monthly.

V O L. I.

Paterna bona tempus interdum facit

Aliena, servans interim corpora:

Unum autem vite praesidium in artibus situm est.

Hipparchus.

LONDON, Printed for D. Rhodes near Bride-lane in Fleet-street.

And for J. Harris at the Harrow in the Poultry. 1693.

Where are to be had the Memoirs for *January, February,* and
March.

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A. B. R. 1743.

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Memoirs for the Ingenious.

APRIL, 1693.

LETTER XIV.

To the Author of these Memoirs.

A R G U M E N T.

Occasion of this Letter. The Author's opinion, That Springs and Rivers owe their origin to the pressure of the Atmosphere upon the waters of the Sea. That the Atmosphere does strongly gravitate upon the Terraqueous Globe, prov'd by several Experiments. Attraction or Sucking an absurd Notion. How salt Water comes to be made fresh. That Water freed from the pressure of the air will of it self rise perpendicularly, and pierce through the Pores of Sand and Gravel, prov'd by reasons and experiments. Whether it be true that Water will rise no higher than its head or level? How being got up almost to the top of the Hills, it gets out again into the open air? Of a Hog that found out a Salt Spring.

Reverend Sir,

YOU give us a good account in your first Letter of the two most remarkable and generally received opinions concerning the origin of Springs and Rivers. I have formerly spent some of my leisure hours in such delightful speculations, and particularly on that subject; but could never yet meet with any solution that

P

was

was not attended with many improbabilities, and most of them with seemingly invincible difficulties. Certainly the subject is of that Dignity in its own nature, and of that importance to the conveniences of humane life, that it well deserves our serious study. I could never approve of positive assertions in such remote and difficult enquiries, and am very sensible how little reason I have to pretend to it; but yet I think I should be injurious to truth, if when it seems to appear with convincing evidence, I should yield no greater deference to its dictates, than to meer conjecture and supposition. Sir, In the opportunity of your ingenious conversation I communicated to you in what manner I apprehended this great work of nature to be effected; and though you did not presently acquiesce with me, yet upon further debate you were pleased to judge so favourably, as to desire me to publish my notion of it, especially for that it is not meerly argumentative, but grounded upon familiar and obvious experiments. I comply with your request the rather, for that I have observed we often happen at last to meet with truth, by enquiring for it where it was not.

My apprehension then is, That the Sea is the material cause of Springs, and that the gravitation or pressure of the Atmosphere upon the vast surface and body of the Seas and Waters round the terrestrial Globe, is the efficient cause: or to use more familiar terms, since these Letters are designed for the generality of Readers, I conceive the Seas round our Globe are every where so forcibly compressed, and as it were squeezed together by the weight and pressure of the Air upon them, that in what part soever they can be freed, or but something eased of this weight and force which keeps them down, the Water will of itself rise to a very great height; and consequently that the Sea insinuating and working itself into the vast cavities of the Earth, and being there by the close texture or crust of the surface, sheltered and defended in a great measure from the pressure of incumbent Air, it did at first by degrees creep up, work its way, and raise itself even to the tops of the high hills, through the veins and spaces of the earth, and also through the gravel, sand, and looser earth, which it met with in its way, though there were there no sensible veins or clefts to favour its passage. That being there encreased to great quantities, it did spread and dilate itself through the body, and to the sides of the hills, and having acquired great strength by its bulk and innate gravity, it often found out, and sometimes made declivous passages down through the surface into the open air again; and so many Springs meeting together, formed small Streams, and many Streams joyning made great

great Rivers, which descending in their chanel through the lower Earth, return again into the Sea. And by this communication and perpetual motion, neither the Rivers come to be emptied, nor the Sea to be over filled.

I have been something the more prolix in this description, as desiring to be fully understood by every one; and hope on the other hand, I may obtain of the Reader this moderate request, that he would suspend his censure till he is come to the end of this short Dissertation; since neither the limits of a Letter, nor, as I hope, the perspicuity of the subject will admit of being tedious. To proceed with some method herein I think it pertinent to prove, 1. That the atmosphere or air doth strongly gravitate or press upon our Globe of earth and water. 2. That whenever the sea or water is freed from this pressure of the air, it will of itself immediately rise perpendicularly in tubes or pipes, and even pierce through porous bodies, and thro gravel, sand, and the looser earth; in the evincing whereof I shall chuse to make use of the more familiar and obvious experiments, as carrying with them a more plain and satisfactory evidence and also for that they suit Philosophers of our station better than those more remote and curious ones; which as they are farther fetched, so they are dearer bought.

As to the first, take a piece of board plained even and made very smooth, lay it horizontally upon a smooth and even table, so that the board and table may exactly touch, especially in the extremities of the board, that the air may not come between. I say you shall perceive the air to press so hard upon the board, and keep it down so forcibly, that you will find it difficult to pull it perpendicularly up from the table: And this will appear yet plainer, if instead of a piece of board, which, tho never so carefully plained and smoothed, will still be rugged and porous, you take two pieces of fine glass evenly ground and well polished, and place the two polished sides together horizontally, the air will press so much upon the uppermost glass that you can hardly take it up perpendicularly from the lower without danger of breaking, and you will be forced to slide it off, that you may let in the air underneath to your assistance. Now there is to be no moisture nor glutinous substance between the board and table, or the glasses; what then can be imagined so to hinder the lifting up the uppermost, but the weight of the air upon it? Indeed if you raise one corner, and thereby let in the air between, as I before intimated, that, by its elastic or springing nature, being itself very much compressed, will help up the board or glass: so that to try the experiment truly, care must be taken to lift

up the whole peice perpendicularly. And what else keeps up the water or Quicksilver in the pipe of the Weather-glass, but the weight and pressure of the air upon that part of the water or Quick-silver which stagnates in the box wherein the mouth of the pipe is dipped? And may we not perceive the air to gravitate even upon our own heads and body? for with all the strength we have we can leap up but a very small height into the air, but can leap forward six times the distance, and with more ease: a pail full of water immersed in the water is easily drawn up till it come to the top, and meets the air; the pressure of the air being chiefly perpendicular.

But lest I should seem to trifle in a matter so generally known in this age, I shall not multiply instances but proceed to the proof of the second assertion that the water, when freed from the pressure of the air upon it, will of it self rise perpendicularly, and even make its way thro gravel, sand, and the lighter earth, the truth of which will readily appear, if we do but consider our usual and familiar experiments with the least attention; for, do but take notice how water comes up into a Syringe; we dip the mouth of the Syringe into the water, whereby that part of the water which is directly under the mouth is defended from the pressure of the air, except only of that little contained in the small pipe of the Syringe: then we draw up the *embolus* or handle whereby that little air is dilated, and room made for the water to rise, which thereupon immediately springs up and fills the body of the Syringe, escaping as it were from its Prison, whereto the pressure of the air had confin'd it.

It may be some Persons who do not trouble themselves much to examin the true meaning of words, will be apt to say, the water doth not rise of it self, but is sucked up by the pulling out the handle. For answer I say, there is no such operation in nature, as sucking in the sense here used, and the word itself is not understood, and only a refuge for ignorance, such as occult qualities, plastic virtues, antipathies and the like; for what must this suction be, but drawing? and how can any thing be drawn, unless it be laid hold of mediately, or immediately? and what hold can be laid on water, or what sucking virtue, if any such there were, is the handle indued with?

But lest this sucking notion should not easily out of the head of some, perhaps out of respect to the kindness they apprehend, it formerly did them, I shall pass to another very obvious experiment, not at all liable to this fancy. Fill a Bason half full of water, lay a Linnen, or rather Woollen rag, or slip of Flannel, so that one end may dip in the water, and the other end hang over the brims of the Bason; the experiment will be the sooner performed, if you first

wet the cloth and wring it, you shall in short time perceive the water in the bason to creep up through the pores, or vacant spaces of the cloath, and to get over the brims of the bason, as it were the top of a hill, and descend through the other part of the cloath which hangs over: and if that end hang something lower than the end which is in the water, all the water in the bason, so far as the cloath is dipped into it, will rise over the brims, and run out through the cloath upon the floor. And the like would happen to the Sea, if the Rivers did not run into it to fill it again.

And even if you dip the one end of a Sponge, or of a piece of new Bread into the water, the water will insensibly rise up through the pores; or take a glass tube or pipe with only one orifice, such as is used in Barometers, you cannot easily get out the air inclosed in it; but if you heat it, part of the air will be thereby expelled, and the rest so dilated or rarefied, that a small portion will suffice to fill the cavity of the pipe. Then dip the orifice in water, and as the pipe cools, and thereby the dilated air comes to be again condensed, and to take up less room, the water will mount up in proportion to the degree of heat and length of the pipe.

Or put a piece of flaming paper into a drinking glass, and invert the glass with the lighted paper therein upon such a quantity of water in a bason as the glass will hold; the water will presently rise up into the glass, the lighted paper having expelled and extreamly rarefied the air that was in the glass, and thereby freed the ascending water from its pressure.

We know that Seamen in long Voyages, when they are in want of fresh water, do often dig holes in the sand near the Sea, and there usually find water tolerably fresh. They have also an ingenious way to facilitate it, they take two Hogheads, and bore the sides full of holes with a Gimlet, setting them one upon the other in the hole they have digged in the Sand, they will find in a nights time, or less, a good quantity of water in the Hogheads, which is percolated or strained through the sand and holes into the Vessels; and the further they remove from the Sea, the fresher they find the water, but it may be the lesser quantity.

And here you may take notice how the salt water comes to be made fresh, (*viz.*) by being strained thro the fine Sand and Gravel, whereby the gross saline particles are kept back; and much more when instead of a small distance from the Sea, the water is forced thro so long a passage, and so many different sorts of earth, even to the tops of high Hills, far remote from the Seas. For besides the percolation, the gross particles of Salt are heavy, and not apt to ascend

ascend with the purer and lighter water : neither indeed is it judged that the Sea is so salt at bottom, for the continual agitation of the surface catching as it were, and wrapping up the heat and beams of the Sun together with the nitrous air, a great part of its saltness is thereby generated towards the top. And we have very credible relations that in many Seas fresh water is drawn up from the bottom, the art whereof consists chiefly in the Engines being made to open and shut in due time.

(1) Hist. of
Learning,
p. 58.

Add to this the (a) experiments which assure us, That the Sea is colder at the bottom, and therefore less salt, and appears so even to the taste ; which last observation I desire may be taken notice of, in answer to the *Cartesians* opinion, who hold that the central fire in the earth, left there, I suppose, ever since our Globe was a Sun, doth by its heat drive up exhalations out of the Sea thro the Hills, sufficient for a continual supply to the Rivers. But it seems it is in such haste, that it doth not stay to warm the bottom of the Sea in its way. Now it is generally held, that there are above a Thousand great Rivers which continually empty such vast quantities of water into the Sea, that in 24 hours time it so receives the quantity of half its whole bulk ; and what caverns will suffice to contain such quantities of Exhalations ?

But I fear I deserve to be pounded for straying so far. I shall only add one experiment, to come to a closer proof of this assertion. Fill a long glass pipe of what diameter you please, with fine gravel or sand, tie a piece of thin Lawn or hair Sieve about one end, so as to keep the sand from falling out, dip that end into the water perpendicularly, if you please, you will find the water will work its way up through the sand, and in time ascend even to the top of the pipe : now pray can any assertion be proved more literally true ? 'Tis but supposing this tube so filled with sand to be a mountain, as many such pipes full of sand will make one ; and why should not the water be admitted as well to rise through the sand, gravel, veins, spaces and clefts of a hill, as we see it does thro the gravel, sand and vacuities in a glass tube ? The conveniences for its ascent are much more in hills, than in the pipe ; and the pressure of the Atmosphere far greater on the globous surface of the seas, than upon the level surface of the water in the bason, as may easily be demonstrated ; for the sides of the bason keep off that sort of pressure, which the rising globe of the sea is on all sides exposed to : and this pressure on the globe being in direct lines towards the center, and consequently joyning closer at some distance below the superficies of the sea, they cause a far greater pressure towards the bottom of the water,

ter; not unlike the Sun beams, which passing through a convex glass, and uniting towards the *focus*, they become so strong, and act with such vehemence as to set things on fire, which before they could hardly warm. Add to this the innate gravitation of the huge bulk of the Sea it self, the extraordinary force of winds and tempests upon it, the great weight and pressure of the flowing tides continually rowling down, and the reflexion of the Sun beams from the Moon; the rapid and in effect contrary motion of the earth with which the water cannot keep pace; the perpetual agitation and force which the Sea lies under, nothing of which is to be found in the water contained in the Bason. So that whoever shall go about to compute the degrees of the pressure upon the Sea in its natural situation, and to calculate the effects thereof by what he may see in the extravasated water in our little Bason, must needs be much out in his reckoning; for most certainly the greater the pressure is, the more forcible and higher the water will rise, when freed from it; not unlike to the water brought in great pipes or trees, which the higher the bason or reserver is, from whence the pipes come, the higher the water will rise in them.

As for that misunderstood rule, that water will rise no higher than its head or level, that is to be understood, when the water lies open to the air at both ends, which is no wonder, for then the air hath an equal power upon both ends, and doth keep them both down alike. But what we contend for happens only when one end is freed from the pressure of the air; neither indeed will it seem matter of great admiration, if this principle be well considered. For if two Scales be kept even with a pound weight in each of them, and you take half a pound out of one Scale, must not that rise? And if you take out the whole pound, must it not rise with the greater force? And now that there is an æquilibrium in water and liquid bodies is sufficiently known, the doctrine whereof is, it may be, one of the most curious and useful parts of the Corpuscularian Philosophy, and which depends upon, and is ultimately resolvable into our principles. And I doubt not but these observations will be answers to some objections which may seem to be of moment.

I could add several other arguments, as observations on the motion of Liquors in Syphons, and divers other experiments: but none, I confess, that, in my apprehension, gives a plainer demonstration of the matter in question than this last. So that I shall proceed a little farther to explain another part of this Hypothesis, how these waters being thus got up almost to the top of the Hills, do get out into the open air? I conceive this may happen several ways. 1. The frequent rains and melted snow may soften and penetrate the surface,
and

and loosen the earth; and so open veins and passages for the inclosed water to get out; and likewise long droughts causing the ground to chap and open very deep, may produce the same effect. 2. Trees and woods with their roots pierce into, and open the earth. 3. Earth-quakes often shake and rend hills in such manner, that, as very credible Authors relate, Rivers have gushed out at the vast overtures, and continued running. 4. Mens labour and even Beasts may sometimes occasion it. You give us, Sir, a very surprizing relation of your Country-man who can find out Springs by his divining wand; and I have read a divertive story to this purpose, That a Country-mans Hog near *Lunenburg* having turned up the ground about him, and continuing still to root for something he smelt there, a salt Spring suddenly broke out in the place, and quickly filled the hole he had made: The Hog, as is usual with those creatures, laid himself down in it, but the Spring still increasing about him, he did not like his bed, and rose out well soaked in the brine: The Sun shining hot quickly dried a good part of it, so that the white particles of Salt hung thick and shining upon the Hogs bristles and hair, and were very discernable; the Country-man happening to see his Hog in that condition, and quickly perceiving that it was good Salt that hung upon him, he found out the hole and the Spring, and afterwards digging for the conveniency of that, several other salt Springs were found out near thereto. By that Salt-trade the City became populous and rich; and in memory of the accident the Hog was salted, and cut into quarters, and hung up in the Town-hall, where it yet remains so dried away that it seems to be little more than the skin.

And thus having conducted our Sea-water through the hills into the channels of great rivers, we shall leave it to run securely, I hope, into the Sea again. I did intend to have added some reasons why this opinion seemed so plausible to me, and what I judged most unaccountable in other hypotheses, and to have stated and answered some objections which I apprehend may be raised; tho I can think of none which I judge may not be very satisfactorily answered, and against which I have not herein made some considerable provision. But I fear the pressure of the atmosphere has also raised my Letter beyond its due limits. I shall conclude with this request, That if you think fit to publish this almost extemporary discourse, you will please to have an Eye to the *Errata's* of the Press, wherein your Printer is something remiss; and with your accustomed candour excuse those that may have been committed by your affectionate Servant,

April 9. 93.

C. J.
L. E. T.

LETTER XV.

To my very good Friend Mr. J. C.

ARGUMENT.

A Confirmation of the foregoing Hypothesis, concerning the Origin of Springs. An account of Gravity: That it is natural to Bodies, and a plain consequence of their impenetrability. That all Bodies lie heavy upon each other. That this heaviness imports a rectilinear perpendicular Motion. Why projected Bodies do not fall into the Sun, if it be the Center of the World? Why they return to the Earth, and why their Motion is accelerated in a Geometrical proportion in their Descent? Whether these Phænomena may be explained by supposing an attractive Power in the Center of the Sun and Planets. That the Air and Water gravitate on their own Elements, Why we do not feel the pressure of the Air, nor Divers that of the Water?

Honoured Sir,

I Look upon your Letter of the 9th of this month, as one of the greatest favors you have bestowed upon me: for many ingenious men who might enrich these Memoirs, and the Commonwealth of Learning with very fine notions and useful discoveries, but excuse themselves with pretended distractions and business, may learn by your example, That there are none so great, but a generous mind may go through them, and find still some leisure hours to spend in Philosophical speculations.

I am wholly perswaded of the truth of your Hypothesis, That the rising of the water above its head or level is hindred by the pressure of the Atmosphere; and that whensoever it is freed from that constraint, as it happens in subterraneous Channels, it must necessarily

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rise

rise above the ground, which is heavier than it, especially after it has been cleansed from its salt and other gross and terrestrial particles, which it leaves among the sands. Besides that we may conceive these Channells very narrow, so that the filtrated water cannot stagnate there, being still pressed forward by other water coming from the Sea.

I do not well see what can be objected against so plain an account, confirm'd by so many and easy experiments, unless it be that common prejudice, that bodies do not gravitate in their proper places, as air in the Atmosphere, water in the Sea and Rivers, stones upon the ground, &c. Whence they will be apt to infer, that it's not the pressure of the Atmosphere, that keeps water from rising; but that it is a natural property of that Element, that it cannot rise above its head or level, as appears, add they, in the instance of Syphons.

I leave you to resolve that instance, as well as the other objections, that may be made against your Hypothesis, which I do not doubt but you will successfully perform. I take only for my present task to examin, Whether bodies do not gravitate in their proper places? which tho it be an opinion generally receiv'd, and enter-

(a) Prin. p. 4. n. 26. tain'd even by the great *Descartes* (a), yet I hope I shall demonstrate it to be a meer prejudice, and a false notion.

This will ingage me into one of the most difficult discussions in Physics, viz. to inquire into the nature of gravity; which so many Philosophers have hitherto attempted in vain, for I never met with any judicious and thinking Person, that was wholly satisfied with any of the Hypotheses either of the ancients or of the moderns; so that one of the greatest Mathematicians and Philosophers of this age told me once, That there were bodies which had a propensity to unite together; and others on the contrary to fly from one another: and this was all we might hope to know concerning their nature.

It would then be loss of time to propose and confute all those opinions that are different from mine; most of their Abettors being sensible themselves, That their conjectures have no certain foundation. And therefore I shall endeavour to lay a surer ground, and to take no borrow'd notion for the main prop of my Hypothesis, but only natural Idea's and daily experiments.

1. *Matter is a compound of several particles subsisting independently of each other*: For matter can be, and is oft divided into such particles; but if matter was essentially one, it could not be divided, and therefore matter is a compound, &c.

2. *The first bodies or particles that enter into the composition of matter are of an unimaginable smallness*. This appears by the incredible extension,

April, 1693.

III

tension of Gold, the effluvioms of bodies, the least corpuscles that make up the blood, Nerves, and other Organs of little Animals, &c.

3. *These particles are of different bulk and figure, or at least become so by their various complications.*

4. *These particles are impenetrable, solid and unactive.* Matter is impenetrable and unactive, but the whole is of the same nature with its parts: and therefore the first parts, or least particles of matter are impenetrable and unactive. As to solidity, it has been proved elsewhere (a) that the least particles of matter were indued with it: and it cannot be deny'd, unless we should admit a real infinity of parts actually divided from one another, in the least corpuscle imaginable. (a) p: 62, 64.

5. *Whatsoever is bulky, impenetrable and unactive, is heavy.* Experience teaches us, That the weight of bodies increases in proportion to their bulk and impenetrability. A Pound of Gold is bigger and heavier than an Ounce; and a certain quantity or mass of that metal is less porous, and also heavier than an equal quantity of Tin, that has more pores in it. As to unactivity, Tho the figure and inward constitution of compound bodies may render them more or less proper for motion; yet we see that, all other things being equal, bodies are the more unactive and ponderous, as they are more bulky and impenetrable, or have more matter and fewer pores in them.

6. *A heavy body cannot remain in the place where it is, unless it be underpropt by other bodies.* For if it could, then it would have some force to keep up itself, and therefore would not be unactive. And as a man must have force and life to stand up right, and much more to resist the Tide, or the Current of a River; so bodies pressing down each other, if one of them could withstand that pressure, without being underpropt by others, it would have more force in itself alone, than that huge part of the System of the World that should lie upon it.

Then, you will say, it is no natural heaviness that carries bodies down, but the gravitation of others upon them. I answer, That this gravitation is a partial, but not a total cause of their fall. For if there be no natural gravity, what is it that presses down to the center, the bodies that lie round about the utmost bounds of this world? It's undoubtedly the same cause that carries down Quick-silver, in the *Torricellian Tube*, where there is no sensible air to press upon it, viz. The natural unactivity of matter, that makes it the more unable to keep up itself, as it is more compact and bulky. And therefore

7. *All bodies lye heavy one upon another* ; for a body having no force to keep up itself, by the fifth and sixth propositions, it must be held up by others; and if it be held up by others, then it must lye heavy upon them.

Here you have a plain reason of the solidity of bodies, without having recourse to the indivisibility and mutual complication of Atoms, or to the pressure of the subtil matter. For tho' the least particles of matter be solid, yet it would be a hard task to prove them essentially indivisible. The subtil matter of *Descartes* penetrating all bodies, and being in a perpetual motion, will rather serve to facilitate their division, than to cause their solidity. And tho' the pressure of the air may be a partial cause of this quality, as well as of heaviness; yet it appears that it is neither the total, nor even the primary cause of it. For if you put a piece of gold, or any other solid body, in Mr. *Boyle's* Engine, and then pump out the air, that body will not become the more fluid, nor the lighter for it.

But supposing the first constituent particles of matter to be essentially heavy and unactive, as well as impenetrable, and consequently to lie heavy one upon another in compound bodies, proportionably to their bulk, the number of their pores, and the quantity of matter that is in them; it follows that they must be solid and resist their division, according to the degrees of their heaviness, or as they more or less compress one another by their own weight. Thus the particles of Gold and Marble being supposed heavy, having less pores or vacuities interspers'd amongst 'em, and touching one another in most of the parts of their superficies; Gold and Marble must needs be heavier and more solid than Lead and common Stones. As to hardness, in as much as it differs from solidity, it has its particular cause, viz. the rectitude of the hard body. Thus Copper and Steel are harder, but not so solid and full of matter, as Gold and Silver are.

8. *In a Circle or Sphere, the Center is reckon'd the lowest place, and all the straight Lines drawn from the Circumference to the Center are equal, and the shortest that can be drawn.* Thence it comes that a body moving perpendicularly, when destitute of its prop, is said to have a tendency to the center; because on what place soever of the globous superficies it may fall, a straight line may thence be drawn to the center, equal to any other line drawn from any other part of the same circumference to the said center. However this is not exactly true, if we believe what has been demonstrated of late by two famous Mathematicians, Mr. *Newton* (a) and *Huygens* (b), that the Earth is higher at the Equator, than at the Poles: for how little so-

(a) *Princ. Math. P. 3. prop. 20.*
(b) *Tr. de la pes. p. 154. & seq.*

ever a globe differs from the spherical *figure*, the lines drawn from the center to the circumference are no longer equal.

But here arise two greater difficulties. 1. The Sun being most probably accounted the center of the world, and natural gravity carrying bodies to the center, a body cast up in the air ought to fall into the Sun, and not to return upon the Earth. 2. Natural gravity being an uniform cause must produce an uniform motion; so that no reason can be given by that principle of the different degrees of motion in projected bodies: which when they begin to fall down increases in a Geometrical Proportion, as the odd numbers 1, 3, 5, 7, 9. So that if you let fall a stone at the height of 25 fathoms, and it runs through that space in 5 seconds of time, it will pass through the 1 fathom in the 1 second, through the 4 in the 2 second, through the 9 in the 3, through the 16 in the 4, and through all the 25 in the 5, according to the calculation of *Galilei*.

To answer these objections, I observe 1. That all solid bodies emit effluvia, in proportion to their bulk, and the constitution and agitation of their parts. This appears in Animals, Flowers, Plants, the Loadstone, Amber, &c. 2. Of these effluvia some are sharp pointed, others blunt, some hooked, branched, channel'd; some clammy and rough, others polished, &c. 3. These effluvia do not all fly away, but circulate round about the bodies, whence they are emitted; otherwise the virtue of inanimate bodies whose decays are not repair'd by nutrition would be quickly spent. This being suppos'd, I answer, That the Earth does continually send forth exhalations, to the height, at least, of the Atmosphere, and perhaps far higher, since the Moon, that is commonly reckon'd 49 Semi-diameters of the earth distant from our Globe, is observ'd to turn round about it: Of which no good account can be given, unless by supposing that the emanations of the earth do reach so far, as shall be proved elsewhere. At present I desire only, That it be granted that the exhalations of the terraqueous globe rise as far as the utmost bounds of the Atmosphere, that is 3 or 4 miles; which the Phænomena of the clouds, rain, snow and other meteors make evident.

These exhalations are as so many rods and chains of small bodies of different make and figure, one of which is fasten'd to the ground, and the other reaches to a certain height in the Atmosphere. Besides these, there are the corpuscles of the air, which have an elastic Vertue, and bend to and fro like Springs. When a body is cast up in the air, the force of the percussion or projection, compels these fluid and springing rods to yield, tho not without a resistance that quickly spends and consumes the projecting force. As

soon

soon as this is ceased, the body becomes indifferent to any motion besides the perpendicular, that is annex'd to its natural gravity, but is too weak and uniform to overcome the resistance which the bodies interpos'd between it and the Sun, make to this its direction: so that the little rods of exhalations and air, that reach from the Earth to a certain height in the Atmosphere, and thence again to the ground, almost in the manner of water-spouts, tho they have not a sufficient force to carry the projected body along with them, yet are strong enough to determine its perpendicular motion towards the earth: And receiving in its descent continual strokes of the springing corpuscles of the air, its motion is increas'd with that Geometrical Proportion that we have noted before.

Perhaps you will say, That there is an attractive force in the center of the Earth, and in each Planet, to draw on the bodies round about them, at a certain distance, according to the degrees of their compactness or density; as there is the like vertue in the Sun to attract the Planets. This seems at first a very short cut, but the mischief is, that the words *attractive power*, or *vis centripeta*, give no distinct Idea; and that after having taken much trouble to prove, that the Sun and Planets are as many Loadstones, which attract one another, we are as far as ever from the true notion of gravity, till we can determine by what means that attraction is made.

(a) *Prin. p.*
iv. n. 26. And therefore to proceed, Since bodies are essentially heavy, and cannot rest unless they lie upon each other; it is methinks a plain consequence, that they gravitate every where, and even more in their elements or proper places than any where else; their rest being there more undisturbed. *Descartes* (a) denies this upon very weak grounds. He pretends that there is no motion but what is circular, that a body cannot be carried down by its own gravity, unless it drives up another of an equal bulk, but less ponderous; whence he infers, that the superior particles of water, that lie perpendicularly on the middle part of the bottom of a Vessel, do not gravitate upon the inferior, because they cannot do it, without driving up the collateral ones, which are equally heavy with them. A very strange Hypothesis, that seems at first to import, that a vessel full of 100 pound of water would be no heavier, than if its bottom was but just covered. But our Philosopher corrects this his notion, by adding that the particles of the liquor that are perpendicular to each other, joyn their force with the undermost of all, to press that part of the bottom, whereupon it lies; which destroys his former prejudice, and is just as much as we desire.

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That the air gravitates upon the bodies that swim in it has been made evident in this last age by a vast number of experiments. Nay the modern Philosophers are come so far as to determine the degrees of that gravitation. For instance, they can tell you, That a Column of the whole Atmosphere equiponderates an equal column of water 32 foot long, and 28 inches of *Mercury*, more or less, according to the thickness of the air, and the situation of the place.

True it is, that whether we walk, sit, or lye, we do not feel the weight of the air. But there are good reasons for it. 1. Air is a fluid that circulates about us, in which we move, and to whose pressure we are used, since the first moment we were born. We do not feel the weight of our cloaths when we are dressed, nor of our coverlids when we lie in bed, especially in winter time. Must we thence infer, That these cloaths and coverlids are not ponderous, or that they weigh more in Summer than in Winter? We should be apt to think so, should we follow the directions of our senses; but if we consider, that they were given us chiefly for the preservation of our bodies, and the understanding for the discovery of truth: and that therefore the senses in this inquiry ought to be made use of with great caution, and with the necessary corrections of the understanding: then we shall conclude with more reason, that the weight of the air, cloaths and the like, is but a gentle pressure, which tending to the preservation of our bodies, is not troublesome to our senses.

Secondly, The most sensible effect of the natural heaviness of bodies consists in their tendency to a perpendicular motion, as appears by the 5, 6 and 7 propositions. Whence it follows, That the weight of a fluid cannot be felt by animals that move in it, or about which it circulates, because they do not oppose its perpendicular motion. I would intreat those who believe that the air does not gravitate upon them, to try whether they can rise when they sit, without bending their head forwards, and their legs backwards: or whether they can leap up perpendicularly, and keep their bodies in a right line. They will own it impossible, but ascribe this weakness of theirs, to the constitution of their Organs; rather than to the gravitation of the air, or the natural tendency of their bodies downwards. However in Mechanics we are forced to make use of divers instruments to lift up inanimate bodies, and to overcome the pressure of the Atmosphere, and the resistance of their natural heaviness. What other causes can hinder the perpendicular rising of animals?

You have observed, That Eagles and other great Birds, which rise a considerable height in the air, swim lighter and easier in the upper air, than near the ground. At first, I was inclin'd as well as

you

you to ascribe this to the magnetical effluvi-
ums of the Earth, which stick at their wings as a kind of glew. But now I rather think that the quantity of the air which underprops them from beneath is not proportional to the natural heaviness of their bodies: nor to the vast columns of air that press upon them from above: which is the cause of that strong and perpetual motion of their wings. whereby they endeavour to make the counterpoise. And I am confirmed in my opinion, by that small Birds fly easier near the ground than great ones, because the former do not lack so much air to bear them up as the latter; whereas did this difficulty arise from any attractive streams, it would be the same in both.

Water being a fluid as well as air, the reasons we have giv'n for our not feeling the weight of the air, will serve to explain the Phenomenon of Divers, who are not sensible of the huge columns of Water that lie upon their heads, as long as it freely circulates about their bodies. For as this Element is more compact than the air, its pressure is far stronger: and therefore when it meets with some resistance, as when a Diver has any leather Garment about him; it presses so hard against it, that the man is in danger to be crush'd to pieces. This power of gravitation appears farther in the bottom of the Sea, and of the Chanel of great Rivers, which it makes very smooth and level: and the vast hollowneses it digs in the main Ocean: As likewise in dead bodies which it casts up to the surface of the Water. Nay Divers themselves are forced to wear lead shoes of 20 pound weight, and to hang lead plates of 30 or 40 pound upon their Shoulders, that they may stand firm on the bottom of the Water; for otherwise its natural gravitation joyn'd to the force of the stream or current, would catch hold of the first motion they should make, and repel them to the surface. But enough of this, for having had some curious informations concerning Divers and their Engines, I design to reserve them for a particular Letter.

April 18th

LET.

LETTER XVI.

To the Honoured Mr. J. Theodore Heinson, Fellow of the Royal Society.

ARGUMENT.

Occasion and Subject of this Letter, concerning the Omnipresence of Christ's humane Nature. The Author's Design in publishing this Hypothesis. The Power and prodigious Dilatation of Effluviūms evidenc'd in Light and Odors. That God can make an human body, of an ordinary Bigness and Stature, that shall be able to fill the whole Universe with Emanations. That Christ's Body is the most excellent of all. That the Perfection of his Nature, his Union with the Deity, the Government of the World, and especially the Sanctification of the Elect, necessarily requires these prodigious Emanations, prov'd by Reason and Scripture. How these Effluviūms may be exhal'd without wasting his Substance, or endangering the Texture of his sacred Body. The Doctrine of Consubstantiation rightly understood, is not absurd, as 'tis thought by many.

Honoured Sir,

Since the day of your departure, when you promis'd me so obligingly, that your absence should not diminish the Friendship you had shew'd me here: I have often wish'd that I could meet with a Subject fit to entertain you. But the sense of my small abilities made me almost despair ever to find out such curious and important observations, or to handle them so well, as that they

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might be presented to so nice and judicious an inquirer in Philosophical matters, as you are. And therefore I would not let slip the occasion of offering you the following paper, which I have receiv'd from a very ingenious hand. It refers to an Article in which your Church is highly concerned, *viz.* the *Omnipresence of Christ's humane Nature*, of which it endeavors to give a Philosophical and reasonable account. All that I can say of the Author is, that he is a very pious man, and a Member of the Church of *England*. And who knows but there are others of his opinion; which I could heartily wish, as likewise that this explication were relish'd by your Divines. For the misunderstood Doctrine of our Savior's Omnipresence, which is the foundation of his real presence in the Sacrament, has been hitherto the stumbling-block of the Protestants, and the chief, or rather the only wall of separation between our Churches. How happy would I reckon myself, if, by the publishing of this Hypothesis, I might contribute something to a happy reunion. But, I fear, I flatter myself with a fruitless hope, and our sins are yet too powerful, not to turn aside the celestial influences of peace and moderation, which good Christians labor to inspire in our breasts. However, let us hear our Author.

There is one Eternal God, infinite in Power, Wisdom and Goodness; distinguish'd into Three Persons: Father, Son, and Holy Ghost.

The Son of God is infinitely beloved by his Father.

Infinite Love and Goodness, assisted and directed by infinite Power and Wisdom, cannot fail to provide for its best beloved, the best and most excellent things in every kind, that the beloved is capable of; especially in such things, as he must have a very near relation to, and constant and continual use for.

Wherefore if it be so determin'd, that the Son of God (whom we also call the eternal *λογος*) must have a body inseparably united to him, it must be, of all bodies that can be produc'd, the most excellent.

The more active any body is, the more excellent it is; provided that activity be not destructive, but beneficial to, and perfective of its own and other bodies: Every degree of activity, thus qualified, adds a new degree of excellency.

The immediate cause of the activity of any body, are the Spirits that are in the said body: when these are in a great measure exhausted or exhaled, the body becomes dull and languid; when they are again recruited, it becomes lively and active.

April, 1693.

119

By these Spirits flowing out of the body (therefore called *Effluvia*, or Emanations) it operates on other bodies locally distant from it. Thus the Sun by his Raies enlightens and warms the air, water, and earth, with all things therein. The Loadstone attracts Iron: Jet, Amber, Glass, and many other bodies attract Straws, Chaff, &c. Odoriferous bodies affect our Organs of smelling: So do the *Effluvia* of a Man, Hare, Fox, &c. affect the Nostrils of a Dog, or other quick-scented Animal, many paces distant from the bodies out of which they flow. An evil Eye is said to hurt, and the Basilisk to kill with his aspect. And the Sympathetic Powder, and Weapon-salve, are believed to communicate their sanative Virtue to the Wound, at an indefinite distance.

Emanations flowing from the body of an Animal, contain in themselves, and impress upon other bodies the characters of those individuals from which they flow: so that by their adhering to other bodies (removed out of sight, and to a great distance from their source) the said individuals may certainly be distinguished from all other bodies, not only of a different, but of the same species. This is manifest in Hounds, neglecting all other scents, and constantly running on that of the first started Hare, Fox, &c. And well-train'd Spaniels, readily finding out a Glove, Handkerchief, Stick, Stone, &c. toucht by their Masters hands, and hid in a heap of other bodies handled by other men; tho they never saw it before.

The more plentiful, pure, subtile, vigorous and efficacious the emanations are, the greater is the activity of the body, out of which they flow; and the more powerfully will it operate on other bodies rightly dispos'd for the reception of the said emanations.

Emanations flowing into a body rightly disposed for their reception will produce in that body such qualities, as were in the body out of which they proceeded: and by this means thousands of bodies may be altered by one. Thus thousands of Needles may acquire a verticity and an attractive virtue from one Loadstone; and a whole City may be infected by one man; tho not one of all that multitude did once touch him: And 'tis not impossible that health in like manner may be communicated, by balsamic spirits flowing from the thoroughly purified body of a person eminently virtuous; especially if these emanations be directed in their course, and invigorated by the earnest and fixt intention of the soul of the emittent; and eagerly imbibed by the exalted imagination of the suscipients. Nay the thing is not only possible, but really happen'd: For one Mr. *Greatrix*, an *Irish* man, living near the Earl of *Orrery's*, who has not been dead these many years, and has been known by several persons yet

living in the 3 Kingdoms, had the gift of curing the King's evil, and several other diseases, as Dimness, Deafness, the Ague, the Falling-Sickness, &c. by repeated stroaks of his hand. You may find a full account of him, in the *Sadducismus Triumphatus* of Mr. Glanville, p. 84, 85. P. 1. Edit. 2.

Emanations plentifully and vigorously flowing from an eminently active body, into a body eminently passive; but exceeding fitly disposed for their reception and retention, may become a substantial seed, whereby not only some qualities, but the perfect idea, and the lively substantial image of the body from which they flow, with all its properties and virtues, may in the said passive body be produced. Thus we know, That the beams of the Sun refracted thro a Burning glass, and received into combustible matter, will immediately produce therein an *Infant Sun* (if I may so speak) which lives and burns, and shines like his Father, tho in a far lower degree, and will continue so to do, as long as it has nourishment, and is not extinguish'd by any outward accident.

And may not even living Creatures be generated by these invisible and impalpable emanations? Surely if our modern Anatomists, who have far surpass'd all that ever went before them in their discoveries, may be credited; we must allow these emanations to be the only immediate active principles, in the generation of all Animals. For they assure us, That there is no visible or palpable substance to be found, either in the prolific Eggs of Birds, or in the Wombs of viviparous Females immediately after copulation, that may distinguish them from those that are unprolific or sterile. And tho in the ordinary way of generation, this contagion, as Dr. *Harvey* calls it, be communicated by means of carnal copulation; 'tis not impossible that the same effect may be produced, that the emanations may prove as vigorous and efficacious for the generation of an animal, when there has been no such copulation, or any immediate contact. Yea Historians of good repute have long since assured us, That some female animals have been impregnate by the wind, probably bringing to them the *Effluvia* of males of the same kind from remote places. But 'tis enough for my purpose, if the possibility of this way of generation be granted (which I suppose none will deny) tho no animal ever were, or shall be so generated.

Lucid bodies are, of all bodies that we know, the most active; they send forth emanations in the greatest plenty: and the emanations flowing from them, are, of all others, the most pure, subtile, and vigorous. The flame of a Candle of an inch diameter, may be seen, in a dark night, I speak within compass, above 1000 paces distant, it will therefore enlighten a sphere of above 2000 paces
diameter.

diameter, so that the eye cannot be placed in any part of the said sphere, but rays from the Candle will stream into it. And this act of illumination is performed in the twinkling of an eye, before there can be any sensible diminution of the substance of the Candle. Therefore a body without any sensible diminution of its substance, may fill with its emanations a space large enough to contain 1000 Millions of Millions of bodies, of equal bulk with it self.

That these Rays are real Emanations from the Candle, and in very deed the same substance that immediately before was seen shining about the wick, but now disentangled from those fuliginous steams wherewith it was there mixed, is to me apparent, in that they may be recollected by refraction thro a transparent Convex, or Reflection from a terminated Concave glass, or from polished Metal. And if the reflecting *Speculum* be large, exactly ground and polish'd; and the distance from the Candle not too great, the recollected flame (tho as invisible as the ambient air, whilst it has no other body to reside in, yet) receiv'd into combustible matter, will manifest it self to be real fire, by burning and shining, like its origine. And tis worth our observation, that tho the shape of the reflecting or refracting glass be sphaerical, parabolical, or hyperbolical; yet the reproduced flame will be pyramidal, as 'twas before 'twas separated from the Candle. Emanations, if not very much distorted by outward accidents, will retain even the visible Characters of the individual body from which they flow; tho they be hid in the air where they become invisible; tho they be invironed with millions of minute bodies; tho they be cross'd in every point of their line by other Emanations: tho they be reflected and refracted by glasses and thro mediums of different shapes and kinds: yet if after all they be manifest-ed to the sight, they will represent no shape but that of their original.

I might easily enlarge my self upon this subject of illumination, and make it seem yet more probable, if not evidently demonstrate, that fire and light, the luminous body, as luminous, and the Ray are the very same substance. But tis no part of my present design: besides, I perceive by the reading of your Memoirs, that you are going to write of it. This only I shall add that such as will not allow the substance of the Candle (in union with the active principle) to be that which enlightens the air, are obliged to shew where that substance is, or what is become of it after 'tis parted from the wick: which I am sure they can't do.

But because the corporeity of light, and its almost instantaneous flight to as great a distance as its Rays will extend, is question'd by some great pretenders to Philosophy: and other accounts

accounts have been given of the manner of Illumination: I shall chuse such an instance among the objects of another sense, as all own to be a body, whose Emanations indeed are by very many degrees inferior to those of light, both in subtilty and vigor; yet plentiful enough to fill a space many millions of times larger than what is occupied by the body from which they flow. We need go no further than our Candle for such an instance; but because, not believing our eyes, we receive no benefit (as to this matter) from its light, we'll blow it out. Then the Room (suppose it to be 20 foot square, and 10 high) will soon be filled with another kind of Emanation (not so pleasant to our nostrils, as the former was to our eyes) which we know was some particles of half, or not near half, resolved tallow that remain'd in the wick after the extinction of the flame. Let us suppose them to have been the solution of about a thousandth part of a cubick inch of tallow (and more I think they could not be, if so much) they now occupy a space that will contain above 500 millions of such bodies. We may easily conceive their diffusion would have been vastly greater and speedier, if instead of the dull fire that remains in the wick after the extinction of the flame, they had been wrought upon by this most active principle, so as to have their nature quite changed, from a steam very offensive to the Nose, into a light most welcome to the Eye. Would not the space which in this state, they would have filled, bear the same proportion to that which they now take up, that the light of a thoroughly kindled Candle does to the spark that remains in the wick after its extinction?

But when I say that luminous, or odoriferous, Emanations do fill so vast a space, I do not mean adequately; but so as that there is no sensible part of the space, in which they are not present, tho in the mean time millions of other bodies, and emanations from other bodies are contain'd within the same compass: and the luminous or odoriferous emanations, do really and adequately fill no more space in their utmost rarefaction and diffusion, than they did before their separation from the luminous or odoriferous body.

A body that emits Emanations in very great plenty, and with greatest vigor may be supplied as fast as it wastes: and so notwithstanding its unintermitted expence of Effluvia for ever (or as long as God pleases) continue in the same state. Or the supply may be greater than the waste, as in growing Animals and Vegetables, and then 'twill continually increase in bulk or vigor.

Of all Bodies known to us, the Sun is visibly the most glorious; the Emanations flowing from him are so plenteous, that there is no
sensible

April, 1693.

123

sensible part of the Air or *Aether*, within this solary *Vortex*; that is not full of them. So pure and subtile are they, that they pass thro' all diaphanous, tho' otherwise hard, Bodies in the form of Light, and thro' Opake Bodies in the form of Heat. So vigorous and efficacious are they, that the whole Air and *Aether*, for many millions of Miles round, is, as 'twere, in a moment enlightned, and all Minerals, Vegetables and Animals, in this and the rest of the Planets, are warm'd, enlivened, produced or cherish'd by them: And yet no sensible diminution either of bulk or vigor, has been discover'd in it since its Creation, but what was accidental, and has been again repair'd.

Because God is infinite in Power and Wisdom, he can produce a humane Body, not exceeding the common stature and bulk, which in the plenty, purity, subtilty, vigor and efficacy of its Emanations, and in the firmness and durability of its texture and vigor shall as far exceed the Sun, as he does an ordinary humane Body, or the vilest Animal, Vegetable, or Mineral. Let us now suppose, with *Des Cartes*, that those innumerable Stars which discover themselves to our Eyes in a frosty Night, and as many more as you please, so the number be not infinite, which is impossible, are each of them a Sun fixt in the Centre of a *Vortex*, as large as he fancies this of ours to be. It does not exceed the Power of the Almighty to produce a humane Body, (not exceeding the common stature) which placed in the Centre, or upon the Circumference, within or without this prodigiously vast Universe, shall fill the whole with Emanations flowing from itself: And by the said Emanations, shall operate more vigorously in every part thereof, than the Sun does in any part of this *Vortex*.

And because we suppose the Body of the blessed Jesus to be the most excellent, and consequently the most active of all Bodies that are or can be produced; and because the Emanations flowing from it have, *de facto*, been manifested to be more vigorous than the beams of the Sun, (*Acts 26. 13.*) 'tis not, I think, unreasonable to conceive, that the said Emanations are every where invisibly, and, if he please, may be visibly present, in every sensible or determinable part of the Universe: if so stupendous an activity can consist with, and may any way contribute to the happiness of him, who is deservedly the Head of the whole Creation.

That so stupendous an activity may consist with, and be very subservient to his happiness. I shall now endeavor to prove.

Two things must concur to make a Man happy; the perfection of

of his nature, and the satisfaction of his desires: and these two are attain'd only by an Union with God, and assimilation to him.

That Christ's Union with God is the nearest that can be, no true Christian doubts; seeing both natures are so united in him, that they constitute but one Person.

Neither can we reasonably doubt that Christ as Man, or the humane nature in Christ, is more like unto God, and does more abundantly partake of his infinite Power, Wisdom, Goodness, and the rest of his glorious Attributes, than any other Creature does or can.

The Activity we are pleading for, is so far from being inconsistent with this supreme Happiness, that to me it seems difficult, if not impossible to conceive how he can be so happy, *i. e.* how the humane nature in Christ can be so nearly united and assimilated to the Divine, without it.

If the whole humane nature of Christ be wholly comprehended within the narrow limits of a visible, palpable humane Body; he is Θεάνθρωπος, or God-man only in one particular place of the Universe of very small extent, every where else he is only God; and then the Deity lying bare, if I may say so, what hinders but another Man, yea, ten thousand millions of Men may be personally united to the Divine λόγος, and so many Men may be but one Person, than which nothing can be more absurd?

How the humane nature of Christ can be present in every part of the Universe, by any other way than by the foresaid Emanations, I do not understand; but by the help of this Hypothesis, we may easily conceive how the humane nature of Christ personally united to the Divine, does not only partake of God's Immensity, by being every-where present; but also of his Omniscience, by knowing all things; of his infinite Goodness, by communicating himself to all Creatures, according to their several Natures and Capacities; and of his Omnipotence, by doing whatever he pleases in Heaven, in Earth, and throughout the whole Universe.

For I consider, that because God is Almighty, he could create a Soul (*i. e.* a Spirit capable of being vitally united to a humane Body) of so unlimited a Capacity, that, besides its office of informing that particular Body, it shall be able to manage all the Affairs of the Universe, and order every particular action and motion of a Creature, and particle of a Creature therein contain'd, with much more ease and certainty, than these Souls of ours do administer the Affairs of our Bodies.

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'Twould not exceed the Power of a Spirit so endowed, to direct, regulate, and moderate the foresaid Emanations diffused throughout the whole Universe.

And because the Almighty Father does infinitely love his coeternal Son, 'tis reasonable to suppose the Soul of Christ (intimately united to the Divine $\lambda\omicron\gamma\Theta$) to be the most excellent of all Beings that are or can be created.

'Tis therefore as reasonable to suppose, that the foresaid Emanations flowing from his most glorious Body, be they never so plentiful, pure, subtile and vigorous, are more perfectly subject to the dominion of his Soul, than any Member of our Body is to ours. How we may conceive it to work on other Bodies by means of these Emanations, we are now to enquire.

It has been the Opinion of some Philosophers, That Sight is caused by the Emission of Spirits from the Eye to the Object, tho' this be not the common received Opinion; nor is Sight caused this way, except perhaps in some particular Animals, as those that see in the Night: yet, I suppose, none will deny that 'tis possible for a Man to have his Organs or Instruments of Perception so disposed, that he may see, feel, and other ways perceive Objects by Emanations flowing, not from them, but from himself.

This kind of Perception, being active, and not needing exterior helps, as Light, a due consistence of the *medium*, a moderate distance and position of the Object, &c. is much more excellent than ours, which is meerly Passive, and needs those Requisites.

If the Emanations flowing from the Body of an Animal endowed with this kind of Perception, be so subtile as to pass freely thro' all manner of Bodies, diaphanous or opaque, fluid or firm; there can be no particle, quality, motion or alteration in the Body they so pass thro', or are in, that shall lie hid from the Soul that operates by them.

If therefore the Emanations flowing from the glorified Body of the blessed Jesus, be so plentiful as to fill the whole Universe, as the beams of the Sun do the Air and *Aether*; if they be so subtile as to penetrate into the inmost recesses of all Bodies; and if they be so perfectly under the command of his Soul, that he can use them as his Instruments of Perception, according to his pleasure: then we may easily conceive, there can be nothing in the world hid from him, not only as he is the Omnipresent, Omniscient $\lambda\omicron\gamma\Theta$, but also as he is Man.

We may also as easily conceive, how by these Emanations, acted and regulated by his Soul, invigorated by the all-powerful $\lambda\omicron\gamma\Theta$,

he can communicate his Favor, Virtue, Holiness, Purity, yea, his very Substance to every Creature throughout the Universe; to some in a greater degree and measure; to others in a less, even as he pleases: which 'tis hard to conceive the naked Deity can do, because of the infinite simplicity and immutability of his Essence, which can't be more in one place, thing or person, than in another. Thus for instance, was the great Persecutor (afterward the great Preacher) converted, by a glorious Beam of Light, and an audible Voice, proceeding from the Body, and out of the Mouth of the glorified JESUS: which yet would have proved as ineffectual in him, as in those that accompanied him; but that by the operation of the Soul of Christ working in and with those Emanations, the fire of Divine Love was kindled in the now unresisting heart of that happy Convert.

By the same means, tho' not after the same manner, we may conceive that blessed work of Regeneration and Sanctification to be performed in all that do not finally resist the Holy Ghost, working in and by these invisible Rays. These Emanations flowing from the Fountain of all Purity, contain in themselves, and impress upon all rightly disposed hearts, the Divine Character and vivid *Idea* of that life-giving and all-purifying Body: they become a substantial Seed, the Seed of GOD, out of which an *Infant Christ* is generated; which being constantly nourisht, by the incessant inflowing of new Emanations, spreads itself thro' all the parts and members of the Body, making it to increase with the increase of God, and changing it into the same Image from Glory to Glory.

This plentiful communication of his goodness to all Creatures, especially this Generation of his own Image, out of his own substance, in all rightly disposed hearts, in whatever part of the Universe they be: this universal Benefit, I say, and the unspeakably happy effects of it, must needs bring ineffable joy and delight to the Soul of the blessed Jesus; a delight as far transcending any that we are capable of in this World, as the whole Universe does the narrow limits of our Beneficence.

If this communication of his Goodness, if all these glorious Effects, far more and greater than can be numbred or conceived by us, be brought to pass by the foresaid Emanations, their plentiful and continual diffusion throughout the Universe is not at all inconsistent with, but so subservient to, and constitutive of his supreme happiness, as nothing can be more; and without that diffusion, for ought I can conceive or understand, his happiness would be very imperfect.

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And whereas we said above, That God can produce a humane Body, that shall fill the whole Universe with Emanations flowing from itself; and have concluded the Body of the blessed JESUS to be the most excellent, and consequently the most active of all Bodies that can be produced: these Premisses seem to import, that the Emanations flowing from his Body, should adequately fill the Universe. But from the consideration of his goodness, we may conceive a Reason why the Universe is not thus adequately fill'd by them, *viz.* because then those Emanations would exclude all other Bodies out of Being; and so he should want Subjects whereon to exercise his Beneficence. 'Tis his good pleasure to abate of his greatness, and of the power, activity and excellency of his Body, which in this case would be no excellency, that by the plentiful exercise of his goodness, he may manifest the excellency of his Soul.

A like Reason may be rendred, why the Universe, particularly this Earth whereon we live, is influenced by him to no greater a degree than 'tis at present: why 'tis not at all times wholly enlightned by him with as glorious a Light as once shone upon that spot, where *Saul* and his Companions were surprized in their Journey to *Damascus*; or, as we believe the Heaven of the blessed to be for ever enlightned withall: *viz.* because so glorious a Light, so powerful an Influence would over-power the Faculties of the Creatures, and very much hinder the natural operations of inferior Agents, and the free agency of Men; which the Divine Wisdom sees meet to continue in their present state, till the time of the restitution of all things.

The happiness I have hitherto spoken of is proper to the Soul; there is also a happiness of the Body, to which so prodigious an Activity as we have supposed, seems so directly contrary, that the very Being, Frame and Texture of the Body is thereby hazarded every moment. An Activity many thousand degrees short of this, would, one would think, in the twinkling of an Eye, shatter in pieces, and dissipate into Atoms, a Body as hard as Adamant, and as big as the whole Globe of the Earth.

But here there is no fear; for if God have endowed that Body with so great an Activity, and to such excellent purposes, because he is Almighty, we do not doubt but he can, and because he is infinite in Wisdom and Goodness, we may be sure he will give, or rather has given it a firmness of Texture proportionable to its Activity.

We need not fear that by so stupendous an Emanation of Spirits, the Body out of which they flow, shall be left dull, unactive, or spiritless. For we have before concluded, that the Soul of the holy JESUS has the perfect command of the Spirits, both whilst they

are within, and after they are exhaled out of the Body. And so, the more plenteous, pure, subtile and vigorous the Emanations are, the greater is the pleasure; which he can continue as long, and reiterate and encrease, as oft and as much as he pleases: by remanding the newly expired Emanations into the Body, or by supplying it with fresh Spirits from the ambient Heaven.

Wherefore that ineffably vast diffusion of Emanations from the glorify'd Body of the blessed J E S U S, seems necessary for the compleating of his corporeal, as well as spiritual happiness. And by the contemplation of it we may be enabled to conceive; how the Pleasure, which he to all Eternity does or may enjoy, bears a greater disproportion to the greatest that we are capable of in this life, than the whole Universe does to a humane Body.

The same diffusion of Emanations from his glorified Body into us, seems necessary also to the constitution of our happiness: For he is our life, *Coloss. 3. 4.* He lives in us, *Gal. 2. 20.* He is formed in us, *Gal. 4. 19.* We are Members of his Body, *ἐν τῷ σαρκὶ αὐτοῦ, καὶ ἐν ᾧ ὀστέων αὐτοῦ*, made out of his Flesh, and out of his Bones, *Ephes. 5. 20.* What authority any person in the world has to reject the literal sense of these, and many the like expressions in Scripture I know not; let those that do so look to it; let them beware they be not found guilty of wresting those sacred, those divinely inspir'd Writings, to their own great prejudice, and the damage of Souls. Divine Inspiration they do not pretend to, 'tis Reason only that dictates to them a sense of Scripture contrary to, or exclusive of the literal. They know not how a Body can be present any other way than locally, or circumscriptively; therefore the property of being every where must not be allowed to the glorious, spiritual Body of the ever blessed JESUS. They may with equal right reject the Doctrine of the Trinity, as too many now do; for that is as contrary to Reason, and can hardly be more plainly asserted in Scripture, than is the Omnipresence of Christ's Humanity, or of Christ God-man; which I hope I have now shewed not to be so contrary to Reason, as most have imagined. Some may perhaps have a better way of explicating this Mystery communicated to them; but, for the present, I do not understand how that Body can be Omnipresent by any other way, than by these substantial Emanations; much less can I conceive how we can be regenerated, sanctified, or purified, without a real substantial participation of the Principle of spiritual Life and Purity.

If any say that we are regenerated and sanctified by the same means, and after the same manner, that all the holy men of old; who

who lived before the incarnation of Christ, were regenerated and sanctified by ; I say so too. Nor does this concession subvert, or any way prejudice my Hypothesis, if the anciently famous, and commonly received tradition of the præexistence of Souls, particularly of the Soul of the *Messiah*, and its union with, and acting in an Æthereal body, be allowed ; and this we must allow, if we will make sense of hundreds of passages in Holy Scripture. And we must grant too, that the *Israelites* of old (and if they, why not others) were made partakers of the same body. This, I say, we must grant, if we will stick to the literal sense of Scripture, and not wrest it by our own interpretation. For 'tis the assertion of the Apostle. 1 Cor. 10. 3, 4. That *they* (the *Israelites*, who came out of Ægypt) did all eat of the same spiritual meat, and did all drink of the same spiritual drink : for they drank of that spiritual Rock that followed them ; And that Rock was CHRIST. 'Tis certain that the Manna which they saw, and felt, and tasted, and with which their bodies were nourisht, was not spiritual meat ; nor was the Rock that *Moses* smote with his Rod, a spiritual Rock, or the water that flowed out of it, spiritual drink ; any more than the consecrated bread and wine in the Holy Eucharist, are the very substance of the body and blood of Christ. But besides, and in, or together, with this bodily meat and drink, they did partake of truly spiritual meat, and did drink truly spiritual drink ; even the emanations of the spiritual Rock that followed them. The material Rock did not follow them, tho the water did ; but the spiritual Rock did both follow, and go before, and overshadow them, in the pillar of a cloud, in which also they were baptized, v. 2. And that Rock was CHRIST. Christ, I say, not as he is God, for so he is not Christ, nor can he in respect of his Deity, be properly said to follow, or to move from place to place but as he is a Creature whose body was then wholly Æthereal, or spiritual, without any firmly organized center. He has still the same body, tho in part, at least otherwise modified ; and perhaps very much augmented by the conversion of other bodies into his own substance.

But to remove all scruples concerning the possibility of this Omnipresence you must know, That be the universe as large as our fancies can make it, it will not require so impetuous a stream of emanations to fill it, no not by many millions of degrees, as hitherto our Hypothesis seems to make necessary. For, supposing the body of the blessed *Jesus* placed in the center of the universe (or wherever 'tis his pleasure to be) we need not fancy that the end of the ray must reach the utmost bounds of it, the very next moment after it issues out of the body ; nor the next minute, or hour. For the universe once filled with

with these emanations, or with these spiritual bodies, for so I'll make bold to call them : the Universe, I say, being once filled, does, and always will continue full of them. For they cannot be annihilated, or changed into any other substance ; and they will be always kept in motion by his soul, which is ever, and every where present with, and in them, to direct, regulate and moderate them as abovesaid, Perhaps 'tis necessary that they be circulated anew thro the glorified organical body, together with the emanations which we may suppose to be extracted by them, out of those bodies that have been regenerated, and in some measure sanctified by them ; especially such emanations as by their operation have been strained out of those bodies in sighs, and groans, and pantings, and breathings after Christ, in heavenly ejaculations, fervent prayers, and hearty praises. That so both sorts, now intimately united, may by the said circulation, acquire a new degree of purity.

Thence I conclude, *That the humane nature of the blessed Jesus is really and substantially present in every part of the Universe, and is, in conjunction with his Deity, the Principle of spiritual life in all true Christians,* by the way here described, or by some other more excellent. But if he be substantially present every-where, much more in the Holy Sacrament of the Eucharist, the elements of which he has been pleased to call his body and blood ; and which, as all Christians agree, is the chief chanel of his Grace. And therefore the Doctrine of Consubstantiation rightly understood, is so far from being absurd, that it seems to be the most probable account that can be given of our Union with Christ in that Sacrament, asserted by Calvin and other reformed Divines. Last of all, if this use only be made of the foregoing explication, not to ridicule or despise our Brethren for an opinion, which if it be not true, is at least as likely to be so, as any that we hold ; then I have as much as I desire.

April, 20th.

LETTER XVII.

To my very good Friend Mr. J. Gawdy.

ARGUMENT.

That the modest publishing of new Notions in Philosophy is not to be condemned, provided they be not hurtful. Whether the History related in the XI Letter of these Memoirs, was a Vision or a Dream? Three things that appear certain in this Hypothesis. That the Creation of different Orders of Spirits, is not repugnant to the goodness of God.

S I R,

Your objections are so solid and ingenious that I should think myself engag'd to answer them, tho they came from an unknown hand, but much more now that they are offer'd to me by such an obliging person.

You seem to dislike my inserting in these Memoirs an Hypothesis, which I call a Vision or a Dream; because you thought I would advance nothing but what was demonstrable. By your leave, Sir, I do not desire to be so narrowly confin'd. for matter would quickly fail me. It suffices, methinks, that I plainly distinguish between what I intend to prove, and what I only give out for a probable conjecture. Thus I use a very different stile, when I impugn the pretended infinity and fulness of the world, and shew that motion is impossible in that hypothesis: when I endeavour to destroy the Vortexes of *Des Cartes*, and to assert the essential gravity of bodies: then when I propose my conjectures about the causes of the flood, the shortning of mens lives, and the surprizing effects of the divining Wand. And why should I not be allowed modestly to publish my notions, as well as other Writers, especially such as meddle with Metaphysics and Natural Philosophy; since tho I were mistaken, yet they may

may give such hints to others, as may facilitate the discovery of the Truth. I am so far from being over-fond of the *Cartesian* System, that I believe it erroneous in most of its assertions; however I am confident that had not this great man traced out a new way of Philosophizing by his ingenious and coherent guessings; we should still be infatuated with the occult qualities and substantial forms of the Peripatetics.

But to come closer to the purpose. As to the matter of fact, I may assure you that I have dream'd, not the very words of my XI Letter, but somewhat very like it. However I am not sure, whether there was something supernatural in it, or whether it was a vision or dream. For I dream very seldom, because I spend most of my spirits, while I am awake, in hard work and strong application: so that the soul whilst I am asleep, does not find a sufficient quantity of them to raise ideas and sensible perceptions. But when I chance to dream, my perceptions are very clear, and in a manner more sensible than when I am awake. Thus it may have happened, That my imagination being overheated by an earnest desire of unravelling that great Mystery, the essential difference betwixt man and beast, my soul gathering up the remaining spirits, formed those lively impressions and discourses, which I have related.

The only difficulty is how we can get new notions in a dream, supposing it to be purely natural; but this difficulty will vanish, if we consider, That the soul is in some respect a free intelligent being, and that her progresses in the discovery of the truth are stopp'd chiefly by the weakness of her body, and the distractions of external objects; so that in the sleep, when her body is quiet, and external objects leave her undisturbed; she may more freely contemplate her Ideas, and complicate them in such a manner as may unravel great mysteries; provided always there be a sufficient quantity of vital spirits to render her operations sensible to us. Daily experience confirms this conjecture by the strange notions we have in our dreams. I own they are most of them insignificant: 1. Because the soul itself does often mistake. 2^{dly}, Because the vital spirits are sometimes too unruly, and too much us'd to certain motions to obey the commands of the soul. 3^{dly}, Because we do not take care enough to keep our mind free from prejudices, and our heart from passions, to be in a fit state of discovering the truth during the silence of the night.

As to the Hypothesis itself, there are three things that appear to me uncontestably true, and even demonstrable by Scripture and reason. 1. That God created Spirits before bodies. For besides the reasons I have alledged in the said Letter, it may be added, That
the

the sacred Author describes the work of the Creation, as successive and begun with the highest and most excellent beings, as the light, the firmament, the stars, &c. Now that Spirits, that is, thinking, penetrable and active substances, are more noble than insensible, impenetrable and unactive matter, is altogether undoubted. Neither is it less plain that the goodness and Wisdom of God, moved him at first to create such beings as should bear illustrious characters of his perfections, and might be sensible of his beneficence.

2. That some of these Spirits have been disobedient to their Creator, is a truth clearly revealed in many passages of the Holy Writ. And tho I confess that the manner of their rebellion is not so plainly set down, nor what kind of punishment they have undergone for it: yet if we consider,

3. That God is all wise and immutable, that his Laws are so too, and therefore that these his Laws, at least such as are the foundation of all Societies, are as unchangeable as himself: We must undoubtedly conclude, that that excellent summary of Morality, to love God with all our power, and our Neighbors as our selves, was the abridgment of all the Laws which God gave to the Spirits at their first creation: and that these Laws had rewards and punishments annex'd to them suitable to the nature, state and condition of these Spirits.

All this, I hope, will not be deny'd by any Christian Philosopher: but I own that the rest of my hypothesis does not carry so great Characters of evidence. For instance, as to what I suppose that these spirits were created different in order and dignity, some being endued with higher degrees of knowledge and power than others: it may be said that this notion repugns the goodness of God, who is the common Father of all his Creatures, who pours upon them the treasures of his beneficence with an equal liberality, and puts no difference betwixt 'em, unless he be obliged to it by his justice.

However it may be answer'd, 1. That God is all wise as well as all-good, and that his supream wisdom appearing more sensibly by an unimaginable variety of Creatures, than by an uniform Creation: if this variety can consist with his goodness, it must be the most perfect way, and consequently that which God will chuse. 2. This variety may be consistent with his goodness, if the pleasure that there is in the acquisition of knowledge and power, as a reward of having done our duty, be a sufficient compensation for a longer enjoyment. Pray ask those who have had the happiness to discover some evident truth, whether they would have been born with that knowledge? or whether to find out something certain and out of the common road,

road, does not afford a greater delight to their Soul, than any thing they are taught by others? Now the lower Spirits were by our supposition, in a capacity of increasing their knowledge by their meditation, and their power was to be augmented in proportion to their light; so that they were in a state of enjoying, almost continually, the inexpressible pleasure of making discoveries: and therefore in respect of happiness, their condition was not worse, than that of the superior Spirits, which is all that a thinking being can desire.

The Hypothesis of the variety of Spirits is not only very rational, but for ought we can judge by the state of the present world it seems to be the true one. For not to speak of insensible things, whose difference can only consist in the various complication of their particles, we may observe life and sensibility growing up by degrees, from the grass of the field to the sensitive plant, from an Oyster to a Mermaid; and from a Worm to an Ape. I would also alledge that stupendous variety, that is to be found amongst men, even of the same temper and education; but that I do not desire to engage into that famous controversy, Whether this difference proceeds from the various conformation of their Organs, or from the different nature of their Soul.

I never was more displeased at my being confin'd to a certain number of Sheets, than I am now, that my Printers tell me they have matter over and above; so that I am forced to break off abruptly, and to defer the farther proofs of the distinction of Spirits into several Orders, and the answer to your other objections till another time.

April, 25th.

F I N I S.

The CONTENTS.

Letter XIV. <i>A new Hypothesis concerning the Origin of Springs.</i>	101
Letter XV. <i>Another concerning Gravity.</i>	109
Letter XVI. <i>A Philosophical Account of the Omnipresence of Christ's humane Nature.</i>	117
Letter XVII. <i>Of the Subordination of Spirits.</i>	131

Errata, for March.

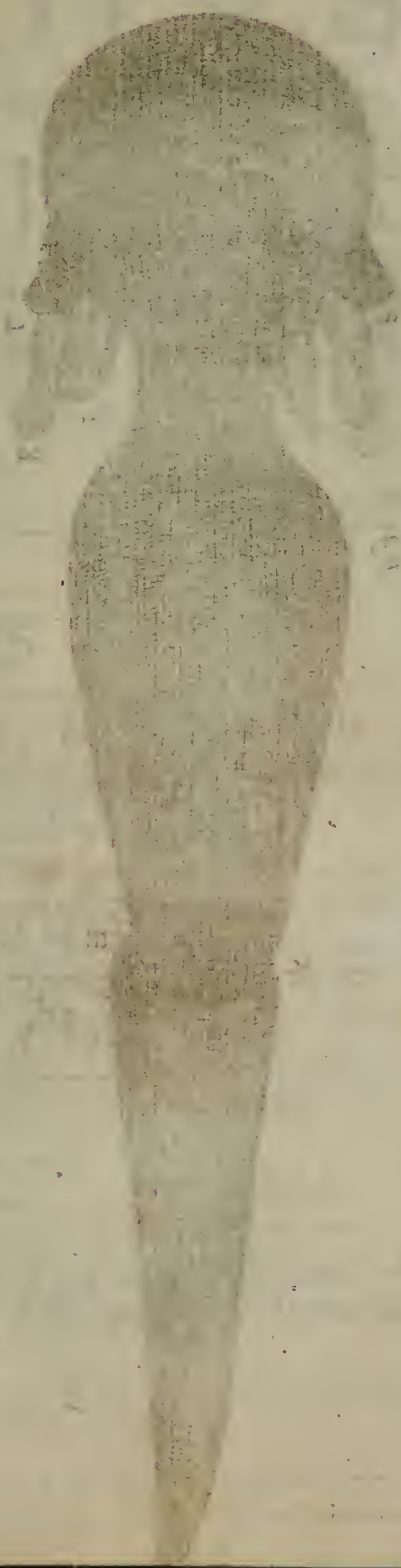
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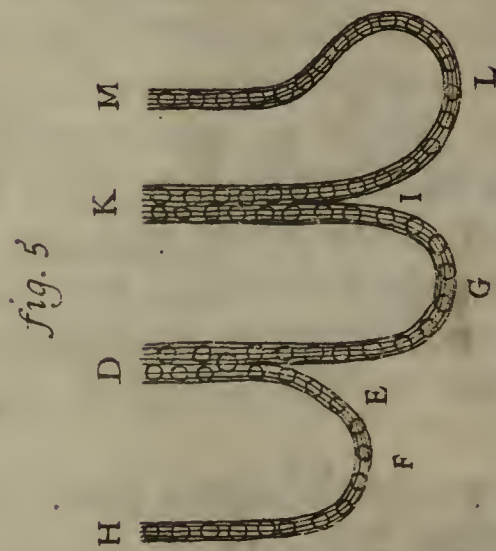
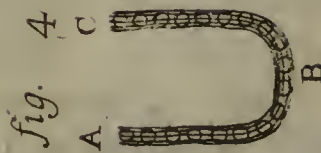
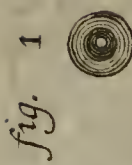
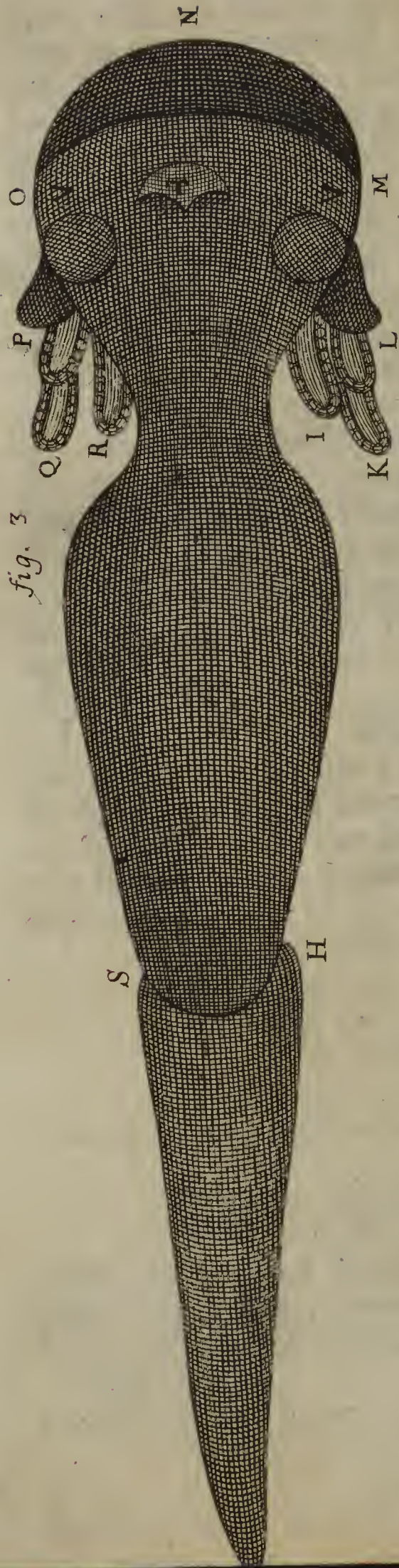
May 20 1871

MEMOIRS

OF

W. H. CARR





MEMOIRS

FOR THE

INGENIOUS.

CONTAINING

Several Curious Observations in *Philosophy, Mathematicks, Physick, History, Philology, and other Arts and Sciences.*

IN

Miscellaneous Letters.

By J. D E L A C R O S E, Eccl. Angl. Presb.

M A Y, 1693.

To be continued Monthly.

V O L. I.

Labor molestus iste fructu est optimi.

Auson. Sap.

Scilicet ingenuas didicisse fideliter artes,

Emollit mores, nec finit esse feros.

Ovid.

LONDON, Printed for H. Rhodes at the Star, the Corner of Bride-lane in Fleet-street. And for J. Harris at the Harrow in the Poultry. 1693.

Where are to be had the Memoirs for January, February, March, and April.

THE Ingenious, who have any Papers to communicate to the Author of these *Memoirs*, are intreated to direct them to his Lodgings; at Mr. Fage's a Turner, in *Play-house-yard*, near the *Thistle and Crown*, in *Black fryars*.

The CONTENTS.

- Letter XVIII. *Observations on the VIII. Letter of these Memoirs, with some Remarks on a late Socinian Pamphlet.* 135
- Letter XIX. *The first and original circulation of the Blood viewed, and described by Mr. Leeuwenhoeck.* 145
- Letter XX. *The Truth of the Discovery of the Murtherers by the French Countryman vindicated, and some farther Considerations offer'd to evince the possibility of the Matter of Fact.* 154

May, 1693, (135) Vol. 1. Numb. 5.

Memoirs for the Ingenious.

MAY, 1693.

LETTER XVIII.

To the Reverend Mr. Milbourne.

ARGUMENT.

Remarks upon the VIIIth. Letter of these Memoirs. Whether it favours the Doctrins of the Roman Church, which the Protestants reject. Difference between Transubstantiation, and the Mystery of the Holy Trinity. Two ways by which the Orthodoxes use to explain that Mystery. The method of the ancient Fathers in teaching the Gospel. Observations on a Socinian Pamphlet, wherein is shewn, That the Account the Socinians give of the Corruption of the Christian Doctrin, as to this Point, is altogether improbable.

Reverend SIR,

I Did flatter my self, that some of our learned Divines should vouchsafe to make Observations on the VIIIth. Letter of these *Memoirs*: However I have not receiv'd nor heard of any, tho' the Subject be of the highest consequence, and the Objections somewhat uncommon. So that what I was afraid of, has befallen me; namely, That I should be forced to answer them my self, lest the Enemies of the Orthodox Faith, or some malicious Adversary should

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take

take advantage of my Silence : neither could I dedicate this Letter more properly than to a Divine, who has shew'd so much Zeal and Learning both (a) against the new Upstarts, the Revivers of the ancient Heresies, as also against (b) the elder Corrupters of Christianity and Tradition.

(a) *Mysteries in Religion vindicated.*

(b) *A short Defence of the Orders of the Church of England.*

Some People have imagin'd that the Hypothesis proposed in the said Letter, favoured the Superstitions that have crept into the Church in latter Ages: For, say they, if the Primitive Christians thought fit to conceal the Mystery of the Holy Trinity from the knowledge of the Vulgar, for fear of exposing it to the Cavils and Derision of the Heathens; there was the same Reason for keeping private the Doctrin of Transubstantiation, which is no less incomprehensible and liable to Objections, as appears by those the Protestants make against it. The worship also of Images, and the invocation of Saints, might have induced the unfaithful to believe, that Christianity differ'd only from Paganism in the object of Adoration; that nothing was chang'd but the outward face of things, and *Jewish* and *Christian* Heroes put in the room of the *Grecians* and *Aegyptians*: and therefore that it was as good still to venerate their own, as to grow fond of those Strangers.

But unhappily for the Objectors, there is not the least mention made either in the Holy Writ, or in the Anti-nicene Fathers of their new Mysteries, which for that Reason, and several others, the Reformed Churches do not stick to name Superstitious. There is not so much as the least hint of a change of substance in the Bread and Wine of the Holy Eucharist, nor any Command of adoring those Elements, of worshipping the Images, or calling upon the deceased. It's true, that those consecrated Elements bear the glorious name of the *Body and Blood of Christ*, and that we are order'd to *eat and drink* them: but besides the figurative sense that these expressions may be taken in, the utmost that they may amount to, is a *Consubstantiation*, which is neither absurd nor impossible, since Bodies can be intimately united with one another, especially by their *Effluvioms*, as may be seen in the 16th Letter of these *Memoirs*.

Had the Doctrin of the Holy Trinity been thus entirely conceal'd, it would be an intolerable Tyranny to impose it upon others as a Holy Mystery, and the foundation of Christian Religion; but since the Scripture and the most ancient Fathers call the Son and the Holy Ghost God, and ascribe to them the supreme Perfection, or the incommunicable Attributes of the Divinity, as infinite Wisdom, Power and Goodness, all the Question runs about the *modus*, or the manner, in which these three infinite *Persons* or intelligent Be-

ings.

ings are one and the same God, or possess indivisibly the sovereign Perfection. There is scarce any thing, whereof we understand perfectly the inward nature or manner of being, not even of the Air we respire, of the Body we live in, or of the Soul that actuates us; so that without an unheard of presumption, we cannot pretend to reach to a plainer and compleater knowledge of the nature of God, or of the manner of being of the sovereign and infinite Perfection, than that which he has been pleas'd to reveal to us by the light of Scripture and Reason.

I can forgive the *Roman Catholicks* comparing Transubstantiation, and the Mystery of the Holy Trinity, as to Unconceivableness, because of the prejudices of their Education; but can hardly have so much condescension for other Christians, who ought to be better informed of the difference that there is betwixt unconceivable and unimaginable, contradictory and not perfectly known, at least before they offer so confidently such odious Comparisons. The best Account that can be given of Transubstantiation, is that of *Rohaut*, viz. That tho' the substance of the Bread and Wine in the Holy Eucharist be wholly changed into that of the Body and Blood of Christ, yet God wills that these Elements continue to reflect the light, and to affect the Taste and other Senses, just as they did before that miraculous change. If there were nothing else in it, this would be indeed a very incredible Mystery, but not altogether incomprehensible, since God is infinite in power; and that as during sleep our Brains may be moved different ways, without external objects; so he may move them at the presence of an object, quite differently from what he did before at the presence of the same object, if he be pleas'd to change or to interrupt the natural Laws on a sudden. But this pretended Mystery implies something more, viz. a plain and perfect Contradiction: For the *Roman Catholicks* do not say, That Christ's Body is present in the Holy Eucharist by any emanations of his Substance, which would have some appearance of Reason, as may be observed in the said 16th. Letter; but they pretend that Christ's Body is locally and circumscriptively in Heaven, and at the same time and in the same manner in several places of the Earth, tho' it be not in the interjacent spaces. Nay, they go so far as to assert, that this Holy Body is intirely and circumscriptively present in each physical particle of the consecrated Bread and Wine, and is still however one and the same numerical Body; than which, nothing can be more absurd and contradictory: for it includes, that several Unities are but one Unity; or which is the same, several individual Bodies one individual Body.

But as to the Holy Trinity, there is no real Contradiction in it; for no Orthodox Divine did ever say, That the three Divine Persons are but one Person, or that they are three distinct Gods; and but one numerical God. They only say, that the Father, the Son, and the Holy Ghost, are one and the same God, or have one and the same numerical essence and substance. True it is, that when they will give a more distinct Notion of that sacred Mystery, they seem to explain it two different ways. Some say, that the three Divine Persons are as many *modi subsistendi*, three distinct manners of being of the Divinity, the Father the Origin and Principle of the Deity, the Son his eternal Wisdom, and the Holy Ghost their eternal and mutual love; and in that sense it is no more difficult to conceive how the Father, the Son, and the Holy Ghost, are one and the same God, than how the Understanding, the Will, and the sensitive Faculty constitute one and the same Soul.

There are others, who seeing that all the properties of Spirits are ascribed to each of the Divine Persons, understand by that word *Suppositum Intelligens*, an Intelligent Being, and do not stick to call them three Infinite Minds; but then they take the Name of GOD as an Appellative; by which is understood the Divine Essence, or the sovereign Perfection, equally and indivisibly possess'd by the Father, the Son, and the Holy Ghost.

Each of these Opinions has ancient Fathers and Doctors of the Church for its Abettors; and you know, Sir, that they are not irreconcilable, as I might easily make out, but that it would carry me too far from my Subject, and therefore I refer the Reader to Dr. Sherlock's *Vindication of the Holy Trinity*, p. 83, 84.

But to come to the matter in hand; All the Passages quoted in the 8th Letter, amount to no more than this, 1. That Piety, or the Love of God and Religion, taught the ancient Fathers a plainer and safer way of arguing, than the subtle Rules of Rhetorick and Logick did the Heathen Orators and Philosophers; namely, to begin with the most simple and perspicuous Truths, and to lay them down as Axioms, whence the more remote and less evident Propositions are to be drawn. Thus the Truths concerning the Unity of God, his Providence, and the future state of Men, being the most incontestable, were to be first inculcated and thoroughly proved to the new Converts, that they might be fitly prepar'd to receive the Doctrins concerning the coming of Sin into the World, the Love of God to Mankind, the sending of his Son into the World, &c. 2. This method agreed extreamly well with the *genius* of the Christian Religion, that is, a most pure and perfect Philosophy, which receives

no Article for fundamental, but what can be prov'd by the light of Reason, or by the testimony of visibly inspired Men. 3. Pastors are spiritual Physicians, who ought to apply their first care to cure such Diseases as are most apparent and dangerous: Now every one knows that *Natural Religion*, which is the foundation of the *Christian*, had been utterly defaced, and Morality abominably corrupted by the *Heathens*, in their setting up of Polytheism and wicked Gods; and therefore these two fundamental Errors were to be remov'd, that a foundation for revealed Truths might successfully be laid. 4. The Pride of Men makes them apt to reject such things as they cannot easily apprehend; but 'tis plain that the Mystery of the Holy Trinity supposes not only the knowledge and persuasion of the natural Religion, and of the Old Testament, but even of most of the Truths of the Gospel; no wonder therefore if the ancient Fathers did not teach it the Catechumens, till they were very far advanced. 5. As we are born and live among Christians, so our Teachers do commonly use a synthetical method, beginning with the most difficult Problems, as the Divinity of Christ, his Incarnation, the Holy Trinity, &c. because there is no fear of our Apostatizing to Heathenism: Besides, that they may rationally suppose, that in so great a light as the Profession of Christianity has afforded us, none but lewd and profligate Men can doubt of the fundamental Truths; so that they have only to prove those revealed Conclusions, which the Pride and Pertinacy of Hereticks do still stily deny. But if the ancient Fathers, in the midst of Persecution, surrounded, as they were, with Enemies on all sides, had delivered the highest Mysteries to the first that desired to be instructed in them, without a previous examination of their Faith and Knowledge, they had exposed them to the derision of the Heathens, and, in all likelihood, Christianity would never have been propagated so far as it has been by the wise course they took. 6. The *Gnosticks*, of whom most of the old Hereticks are the unlucky Brood, did not take from the Christians their mysterious way of concealing their Doctrine; but rather from the *Platonists*, whose Offspring they were; as will plainly appear to any one that shall compare the Tenets and Morals of both. *Plato*, fearing the fate of *Socrates* his Master, kept private the truths of the Unity of God, and of the Vanity of Idolatry, which he communicated only to his most trusty Disciples, and spoke of it but obscurely in his Writings. And that he might not be betray'd, he inspired them with the utmost contempt for the rest of Mankind, as having made themselves unworthy of those great discoveries by their superstitious prejudices. Just such a proud sort of men were the
Gnosticks,

(a) Har. 34. n. 5. *Gnosticks*, if we believe *Epiphanius*. (a) We, say they, are men; all the rest are but Swines and Dogs: and therefore it is said, do not cast your Pearls before Swines, nor give that which is holy to Dogs: in consequence of which, they had set this constant rule to themselves, not to reveal the Father and his Mystery to any, but to keep it private amongst themselves; or if they chanc'd to discover it, that it should be as to one in a Thousand, or to two in ten Thousand. *Plato's* *Metaphysics* are pretty obscure. Whether this proceeded from that he only related some ancient Traditions, which he had learned from the *Caldeans* and *Aegyptians*, and to which he durst not add any thing: Or whether it came from thence, that he had not well digested his matter, I shall not now inquire; but upon the whole it appears, That this Philosopher established several Principles, generated by, and subordinated to each other. According to that pattern, the *Gnosticks* had framed a phanciful Genealogy of Deities, all derived from the eternal and ungenerated Father, which numerous progeny, they call'd by the general name of *Aeons* or Ages; besides the particular names of each of them.

7. As the Gospel was chiefly preached to the *Jews*, and that Paganism produced but few Converts before the ruin of *Jerusalem*, the Apostles had no occasion to conceal the Divinity of Christ, and the Mystery of the H. Trinity; which were partly acknowledged by the *Jews*, and needed only a farther explication and application: and therefore they are plainly taught in the sacred Writings, as appears by the vast number of passages our Divines quote against the *Socinians*. But the *Gnosticks* are as ancient as the middle, or at least the end of the first Century, since they derive their Pedigree from *Simon Magus*, as *Dr. Hammond*, and lately his Grace my Lord of *Canterbury*, have learnedly prov'd; and therefore they did not take that Custom from the Orthodoxes, amongst whom it was not then in use.

8. This scrupulousness crept into the Church by degrees, and it seems that the ancient Fathers grew more and more precise, as they observed the weakness of the new Converts, during the Persecution. And as in matters of Custom men use still to refine upon their Predecessors; so this preciseness was, in the fourth and fifth Century, brought to that height, which, if not condemnable, was at least contrary to the true intention of the first Preachers of Christianity, who never designed to conceal the Mysteries themselves, but only to prevent disputes about their *modus* or manner of being. And this appears by their Liturgy, or form of Prayers, in which besides several Lessons out of the Gospels and Epistles, that were read before all, the *doxologia* was so often repeated, as *Dr. Comber* has invincibly prov'd. *St. Basil* in his Book of the H. Ghost, c. 29.

men-

mentions an Hymn us'd to be sung in the Evening-service, which has been published entire by the learned Archb. Usher, and runs thus in English. *O joyful light of the sacred Glory of the Immortal, Heavenly, Holy and Blessed Father. JESUS CHRIST, now at the setting of the Sun and the rising of the Stars; we come to sing Hymns to the Father, the Son, and the H. Ghost of God. Thou art worthy to be praised at all times, with pure voices, O Son of God, the Giver of life, and therefore the world glorifies thee.* I know not how it may be said that the Catechumens, who might sing this Hymn, or hear it sung every day, had no knowledge of the H. Trinity. Add to this, that the instance of *Arnobius* is a plain evidence of the contrary; for all Criticks agree, and St. *Jerom* testifies it, that he composed his Books against the *Gentiles*, whilst he was yet in the lower rank of the Probationers; yet he speaks thus of our Saviour: And therefore Christ is God in spite of you; Christ is God, I say, for we must say it so often, that we may deafen the Infidels; God speaking in the form of man, by the order of the Sovereign God. (b) *Et ideo Christus, licet vobis invitis, Deus; Deus, inquam Christus (hoc enim sæpè dicendum est, ut infidelium dissiliat & dirumpatur auditus) Dei Principis jussione loquens sub hominis forma.* (b) *Arnob. l. 2. cont. gent.*

The Catechumens were so far from being prohibited the reading of the Bible, that in some Churches, as that of *Alexandria*, they were admitted to the Office of Readers and Singers, if we believe *Socrates* in his Ecclesiastical History, l. 5. c. 22. And how could they be ignorant of that Mystery, when the very Heathens had notice of it, as appears by a Dialogue of *Lucian*, intituled *Philopatris*, where that impious Athiest to ridicule S. Paul, and the Christian Religion, induces *Triephon* a Christian, demanding of *Critias* one that he would make his Profelyte, to bind himself by the following Oath to embrace Christianity. Swear, says he, by the Uppermost, the Great, the Eternal, the Celestial God, the Son of the Father, the Spirit proceeding from the Father, one out of three, and three out of one.

As to the Objection raised from the many Heresies concerning that Mystery, that were countenanced in the primitive Ages, it may be answer'd by this Dilemma. These Heresies were framed either by Catechumens, or by initiated. But Catechumens could not be the Inventors of them, for they knew nothing of the matter, according to my Adversaries: and therefore the first Heresiarchs were initiated, and if so, 'tis in vain to alledge the pretended scrupulousness of the Fathers, as an occasion of the birth of errors; since they never concealed the Mysteries from the Adept's or Baptiz'd Christians.

And now I give it to the acutest Controvertists in the *Roman* Church, to set up this Argument in the finest dress, and to try whether they can make any thing more of it but this; that the ancient Doctors, to prevent scandals and endless disputations, waved a particular explication of the most sublime Mysteries in their public Sermons, reserving it for the private instruction of the *Competentes*, or such, who being already perswaded of other fundamental Truths, were to be admitted to Baptism, as soon as they had express'd a sufficient Faith and knowledge of those mysteries, and an earnest desire of that Sacrament.

But as to the *Socinians*, I defy them to propose any thing that stands so fair for learning and reason as the Hypothesis of the VIII Letter, so absurd is their System, and contrary to all Antiquity. Just at the close of this, the Answer they have made to your Book fell into my hands; I had the patience to read it over, tho with a great deal of indignation for the scurrilous language and unfair dealings of your unworthy Adversary; seeing withal so much impudence and vanity join'd with such a gross ignorance, for this Scribler seems to have read nothing else, besides the Books of his own Sect, and those of our Doctors which he undertakes to confute. But what surprized me above all is, that a man who makes such a figure in the world as Mr. T. F. and who is entrusted with the money of the Poor, should allow such an infamous Libel to be dedicated to him, and to be publicly declared a *Socinian*, and the Protector of those Heretics, as the Author does in these words. p. 5. *Therefore, Sir, if Mr. Milbourn has prevailed with you—you may for all that abide in YOUR SENTIMENT about the Unity of God, &c.* But Charity prompts me to believe that this is Calumny, as well as the impertinent slanders that his malice has vomited against you; at which you will only rejoice, for that our Savior has esteemed you worthy to be a Sufferer for his cause.

This cause has too much strength of itself, and has met with too good Defenders to stand in need of my help. However as these Papers may fall into vulgar hands, I cannot forbear to make the following observation, to shew how much these Pretenders to reason argue against probability. Your anonymous Adversary grants (a) that none of the learned men, whose Memory is come down to us, was of his opinion, unless it be *Aquila*, *Symmachus*, *Theodotion*, *Artemas* and *Theodorus*, * *S. Lucian*, *Paul of Samosate*, *Photin*, *Marcellus* of *Ancyra*. But *Aquila* and *Theodotion* apostatized to *Judaism*, *Symmachus* was first a *Samaritan*, then turned *Jew*, and at last an *Ebionite*. *S. Lucian* is said to have laid unawares the foundation of *Arianism*,

p. 44.

* Read
Artemon &
Theodorus.

anism, by some unwary expressions in his Books against *Sabellius*, but has been cleared of this Imputation by St. *Athanasius*, as well as *Marcellus* of *Ancyra*. The rest are known Hereticks, of whom our Author may boast, if he please, provided he observe that none of 'em liv'd before Pope *Victor* in 180, according to his own Chronology.

In this time it was, that the pretended Apostasie was perfected, if we believe the *Socinians*; *Theodotus* of *Bizantium* having been excommunicated at *Rome*, for holding that our Saviour was a meer Man. This *Theodotus* was a Tanner by Profession, who having forsaken his Redeemer during the Persecution, fled his Country for shame, and coming to *Rome*, began privately to teach, That tho' Christ had been conceived by the Holy Ghost, yet he was not the Eternal Son of God, but only the most Excellent of all the Prophets. Whether he endeavour'd to propagate that blasphemous Opinion, that he might diminish the horror of his Apostasie, or whether he was employ'd by the Heathenish Priests to sow Dissention amongst the Christians, I cannot tell; tho' I am much inclined to believe the last. For 'tis observable, that most of the first Heresiarchs were Apostates, or dissatisfy'd Men; and when I consider the crafty Devices of the Pagan Priests concerning Divination, Oracles, pretended Wonders, and the like; and withal remember how busie Jesuits and Monks have been to put us together by the Ears, I am apt to imagine that Paganism and Popery resemble one another, as well in Deceit, as in Superstition and Cruelty.

Howsoever it be, *Theodotus* lived several years unknown in *Rome*, till at length his scandalous Discourses oblig'd *Victor* to banish him the Church. He left but very few Disciples, who were so inconsiderable, that during a whole Age there is no mention of them. It was but at the end of the third Century, that one *Artemon* reviv'd *Theodotus's* Blasphemies, pretending that he had been wrongfully condemned, and that the Christian Church was of his opinion in *Victor's* time. The matter was discuss'd anew, but with as little success for this Heresiarch, as it had been for his Predecessor. This is the substance of the matter of Fact, as it is related by *Eusebius* in the fifth Book of his Ecclesiastical History, chap. 27, & 28.

Now I leave it to any impartial Reader to determine, Whether the pretence of *Artemon*, and of the modern *Socinians*, has any shew of probability? Whether 'tis likely that the Christians, who in those early times had so much zeal for their Religion, should have suffered themselves to be thus impos'd upon by one sole Bishop, who had no power beyond his Diocese, or perhaps the *Suburbicarian* Pro-

vinces? Whether the Prelates of *Asia*, who so bravely withstood this same *Victor*, when he would force on them an indifferent Custom of his Church in the Celebration of *Easter*, would tamely have yielded him the most important Article of Christianity? I know not what the *Socinians* can say to this, unless they turn those blessed Martyrs into so many Politicians, who, to draw on the Peoples veneration, agreed amongst themselves to make the Author of their Religion a God. But our Adversaries, how impudent soever they be, will yet, I hope, clear the Apostles of that blame. Who then of their Successors manag'd that pious Fraud? Surely a few Men could not do it, they had met with too great oppositions; no, not even all the Bishops, tho' they had been all of one mind (which is very absurd to suppose) had not been able to prevail upon all their Diocesans, since it cannot be deny'd but a great number of them minded only their eternal Salvation.

Perhaps our Hereticks will reply, That this Opinion crept into the Church by degrees, as other Errors have done. But an hundred years is too short a term to make such an universal change, and there is hardly so much betwixt the death of *St. John* the Evangelist, and the condemnation of *Theodotus*. Besides, if the Doctrin of the Holy Trinity has been received that way, how comes it that we cannot trace the several steps of its increase, as we can do of other humane Inventions, Transubstantiation, the Invocation of Saints, the Worship of Images, &c. notwithstanding all the endeavors of the *Roman* Church to suppress the Books of her Adversaries? Certainly he who can digest so many Absurdities in plain matters of Fact, I wonder how it sticks at pretended Contradictions, which are nothing near so sensible, when they relate to Metaphysical Notions, and the manner of subsisting of the infinite Being.

In fine, of all the Hereticks these latter Ages have produced, the *Socinians* appear to me the more confident and ignorant, and altogether unworthy of the pains so many learned Men have taken in confuting them: There are others, who are like to create more trouble to the Church, if care be not taken to prevent it: I mean the *Arians*, whom I wish you will not forget in the Book you are preparing for the Press. I have had some thoughts to this effect, but as they are grounded on an ancient Tradition, that would appear as a new Hypothesis, I am loth to publish them.

May 16th.

LETTER

LETTER XIX.

Written in Dutch by Mr. Leeuwenhoek,
F. of the R.S.

ARGUMENT.

Of two sorts of Frogs. Observations on the Eggs of Green Frogs. Of what Particles these Eggs are made up. Worms form'd in these Eggs. The Make and Figure of these Worms view'd through the Microscope. The Circulation of the Blood discover'd in six Labels hanging on their Head. Propulsions of the Blood, how swift they are. The same Circulation appearing again sensibly in several places of the Tail of these Worms. That the Vessels which are called Arteries and Veins, are but one and the same Conduit. That the first and original Circulation is made in the smallest Vessels. This Circulation discover'd in the two sorts of Frogs. Of an Artery in which the Blood ran backwards, and what might be the cause of it. An Account of Mr. Leeuwenhoeck, and his other Performances. Reflexions of the Author of these Memoirs on this Discovery.

S I R,

I Send you my Observations concerning the generation and growth of Frogs, wherein I have happily found out the true manner of the circulation of the Blood in Animals, which important discovery I hope to improve, and send you a farther account of.

We have two sorts of Frogs in our Ditches: The ordinary ones were formerly in great numbers, but are within these few years mightily diminish'd; because, as I take it, of a kind of very small

Perches, call'd here *Stekel-baarsjens*, which now replenish our Ditches, and eat the Frogs; whilst yet Worms. The reason of my conjecture is, that we had seen none of this Fish before.

The other sort of Frogs are bigger, but not so common; we call them here *Worken*, and the French, who eat the hinder part of them, *Grenouilles Vertes*, or Green Frogs. It is on these Frogs I have made the following Observations. Their Eggs are not so easy to be distinguished as those of the ordinary Frogs, because the viscous matter, in which they are wrapt up, does not swim in so great quantity on the surface of the Water. However having happily met with some of 'em sticking to some green Weed, I brought 'em home, laid 'em in two earthen Vessels, and examining them with my *Microscopes*, I perceived that they were for the most part brown on one side, and yellow on the other. But when I came to observe them the following day, the yellowness was almost vanish'd, a very small part of the Egg only keeping that color; whence I concluded they were but newly laid.

Moreover, I took several of these Eggs out of the transparent and clammy matter with which they were surrounded; but tho' it seem'd to separate itself in two distinct Circles; yet it was so tough and viscous, that how tenderly soever I manag'd it, I could not take out the true Egg, without breaking or rending it, or altering its shape. Notwithstanding having loosened some of these Eggs, the best I could, I observ'd that their membrane, or the thin skin in which they were wrapt up, was made of little black points, not much unlike the knots of Shagreen; that the Egg consisted of a small quantity of waterish liquor, and an incredible number of globules, each of which was compounded of divers smaller ones, and each of these seem'd to have a greater globule in the middle; so that every first globule might be compared to an Egg with a little yolk in the middle.

The figure of these Eggs chang'd from day to day, and grew oblong instead of round: The tails of the Worms were first discernible, and afterwards their heads. In the mean while I open'd every day some of these Eggs, especially on the seventh day after I had carry'd them home, when some of the Worms were already so far grown, as to have a motion: However I could perceive nothing in them but globules: and even after the Worms were hatch'd, and swam in the water, tho' I could distinguish their back-bone, yet when I cut them through, I could observe neither bowels, nor arteries, nor nerves. For it appear'd to me as if the whole Worm had been nothing but globules, especially the belly, which was yellow, being
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made up of that part of the Egg that had kept that color. And I was strangely surpriz'd, that I could perceive, neither vessels, nor sinews, in a creature so big, as to live and move to the naked Eye.

Out of these Observations I concluded, That the viscous matter, which surrounds the Egg, is made only to preserve it, and to feed the young Frog or Worm, till it be able to shift for itself: So that the same thing happen'd here as in the Eggs of Birds; wherein all the inward substance of the Egg, *viz.* the White and Yolk turns into the substance of the young animal, only the shell and the membrane that sticks at it, remaining unchanged.

I likewise perceived several bubbles in this viscous matter, which I look'd upon as a wonderful providence of Nature's wise Author; for these Eggs might chance to lack green to hang upon, whereas now by the help of these bubbles, they may swim on the water, to enjoy the warmth of the air and to be brooded and hatch'd out.

For your diversion, and the better apprehending of my observations, I have caus'd one of these Worms to be drawn to the life (a) See the Plate fronting the Title Page. a few hours after it had rid itself of the clammy substance wherein it lay) by a very skillful designer, so as he view'd it through the Microscope (a).

Fig. 1 represents the Egg. *Fig. 2* the Worm just hatch'd out, both as they appear to the naked Eye. *Fig. 3* is the same Worm view'd through the Microscope, wherein LMNOP, represents the head; HIRS the belly, GHS the tail. Above the head appears part of another skin, mark'd here MNO, which by reason of his thickness, I suppose to be part of that skin, that is to cloath the Worm again, when it is grown a perfect Frog. T shews the mouth, which I never saw this little creature open at that time. VV are two brown spots on the head, which by reason of their circular figure one would be apt to take for the Eyes, were it not that the Eyes cannot be perceived, when the Worm lies in that situation, its belly towards the Spectator. IKL and PQR are six transparent *Pendants*, or six several Labels that hang three on each side of the head.

It's chiefly by reason of these Labels, that I caus'd this Worm to be drawn, for that in each of them I distinctly perceived the circulation of the blood, going from the parts nearest to the body, to the remotest from it, and making a continual and very quick circuit, tho not with an even motion, but with such propulsions as follow'd very close one upon another; so that in the interval of each propulsion, the course of the blood seem'd to retard, and one would have thought there was a stop in it, had he not presently perceiv'd the rising of the vessel, and the next propulsion immediately following.

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I endeavour'd to measure the intervals of these propulsions or pulses, and found that they equall'd, or even surpass'd, the telling of an hundred, how fast soever the numbers be pronounced: whence I infer'd, that the blood was expell'd out of the heart, as oft as these pulses were performed; which, together with the going over of the blood out of the arteries into the veins, I perceived as plainly as can be imagined.

This curious sight I communicated to five Persons of Quality, who were extreamly pleas'd with it. If you ask how we could be so sensible of this circulation? I answer, that this blood does not consist of particles of an even bigness, but that it is made up of smaller and greater globules, which tho they have no color, yet the whole liquor is so bright and shining, as to be easily perceivable.

Some days after the birth, or hatching out of these Worms, the labels were vanished, being doubtless united to the rest of the body, and overgrown with a new skin. And tho I still perceived a very quick motion on each side of the head, yet I could not discern any circulation of the blood, nor even any distinction betwixt the head and the rest of the body; they were now join'd together so immediately.

When the Worms were 8 or 10 days old, I observed that they opened and shut their mouth with the same quickness of motion, that I had been sensible of in the forementioned circulation; by which means I came to discover their teeth, which were so perfectly grown in rows, that they resembled those of a Dog fish.

To get a greater certainty concerning this new way of the circulation of the blood, I continued to examine these Worms that were then 8 or 10 days old, and perceived the motion of a small particle within their body, which I took to be their heart, especially because the matter, that was expell'd out of it, began to grow red. This particle had as swift a motion as that of the foresaid arteries, and as oft as it mov'd, the Eyes of the little creature got some motion too; and therefore I imagined, that the motion of the Eyes depended on the motion of the heart and mouth. These Eyes were round, sticking out of the head, had a black speck in the middle; and appear'd as plainly to me as the Eyes of any little animal use to do to the naked sight.

I opened the belly of some of these Worms, and observed that their bowels lay in round, and were filled with a brownish matter. But my greatest diversion was the examining of their tail, in which I discover'd above fifty windings of the blood in several places, as oft as I could conveniently lay the animal living in the water before my

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Microscope. For I not only saw in many places, the blood carry'd through small vessels from the middle of the tail to the extremities; but even perceived each of these vessels bent like a bow or syphon, to carry the blood again to the inward parts of the tail, and from thence to the heart. This made it evident to me, that the vessels, which we name arteries, and veins, are the same conduits, that may be called arteries, as long as they carry the blood to the extremities; and veins, when they bring it back to the heart. For instance, I saw several vessels in the tail of these Worms, running as *ABC*, *Fig. 4.* now *A C* lying toward the bone of the tail, and *B* toward the extremities of it; *A B* carries the blood from the heart, and *B C* carries it again to it; so that the conduit *A B C* is together an Artery and a Vein. For such Vessels are called Arteries and Veins, in reference to their leading the blood from, and to the heart; but the conduit *A B C* does not carry the blood farther from the heart, than from *A* to *B*, and at *B* it begins to carry it back to the heart through the branch *B C* of the same conduit; and therefore an Artery and a Vein, at least in these little animals, are but one continu'd Vessel.

These Vessels are so straight, that they admit but one small globe of blood at a time, which globules are often forc'd to take an oval figure, that they may have a free course through them, especially when the little creature is put out of the water, and ready to die; for then the blood makes frequent stays in the smallest Arteries, and at each new propulsion of the blood, these globules are stretched twice as much as their natural length, and grow sharp-pointed at both ends. In another place, I observed one of the biggest conduits dividing itself into two branches, as *Fig. 5*, *D* does in *E*, with *EF* and *EG*: so that if *DEF* and *DEG* are supposed to be Arteries, because they carry the blood from the heart; *FH* and *GIK* shall be Veins; because they carry it back to the heart.

I likewise perceived another small Vessel *ML* uniting with the Vein *IK*; so that tho *HF* be a Vein, *DEF* and *DEG* Arteries, *GIK* and *KIL* Veins, and *ML* an Artery, yet they are but a continued Vessel.

In another place, I observed three of the smallest Arteries, bending bow-wise, and uniting together in one point, where they made up a Vein, that was consequently as big as the three said Arteries, which however were so small that all three together, with all the space through which they circulated, might have been covered with an ordinary grain of sand.

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I have often perceived an Artery running across of a Vein, and had not the particular course of each been distinguishable, it might have induced so far into a mistake, as to make one believe, that the circulation was performed through that Vein. This crossing I have been sensible of, not only in the smallest Vessels, but even in such as were ten times bigger than those through which the blood did circulate.

I had formerly been aware of such crossing conduits, when I laboured to find out the union of the Arteries and Veins. But, being perswaded that the original and first circulation of the blood was not made in the biggest, but in the smallest Vessels, for otherwise all the parts of the body could not be nourished, I had laid aside all the thoughts of this nature, supposing such a discovery impossible. And now that it plainly appears that in these Worms the blood is carried from the Arteries into the Veins by such straight conduits as will only admit one particle of blood at the time; we may reasonably suppose, that it is performed the same way in us, and all other animals. And if it be so, then it is impossible, that we should ever be sensible of the passing of the blood from the Arteries into the Veins; First, Because one sole globule of blood lying in a most small and strait Vessel has no color. Secondly, Because the animal being either dead or a dying, or at least very uneasy, when we are about this search, the blood stops in the said conduits. Add to this the unimaginable smallness of these Vessels, of which to be fully perswaded, we need but remember what I have noted elsewhere, that they let pass but one globule at a time; and that these globules, which have no color in themselves, but by their junction make the blood appear red, are so little, that ten thousand of them would hardly amount to the bigness of a large grain of Sand.

I have reiterated these delightful observations several times, upon different Worms, and almost always with the same success. Amongst other things I took particular notice of this, that the propulsion of the blood is not so swift in the small conduits that lye at the end of the tail [Fig. 3] and remotest from the heart, as it is in those that are placed about it.

At each side of the tail bone, I perceiv'd a great Artery running in length, carrying the blood to the end of the tail, and spreading itself into several branches. At the sides of these Arteries towards the extremities of the tail, I discover'd two great Veins, which carry'd the blood up to the heart, and were increased by several little Veins, that discharged themselves into the great ones. And even I perceived in a small part of the tail, that the blood of the Veins circulated

circulated in above 25 distinct Veins. Besides these Veins I observed in the tail a vast number of other Vessels, with their several branches, which at last divided themselves into so many other branches, that they vanished out of my sight. These Vessels issued out of the middle of the tail; but how attentively soever I followed them with my Eye, I could not be aware of any running of the blood through them, tho' these Vessels were bigger than those wherein I had so clearly seen the circulation; which made me conjecture that these Vessels were rather Sinews than Veins.

I communicated this pleasant prospect to two learned Gentlemen, shewing them not only how the blood was carry'd along the great Artery to the end of the tail, and thence through the great Vein upwards to the heart; but I made them also sensible how in several places the blood was carry'd through the smallest Vessels to the extremities of the tail, and thence carry'd back through the little Veins to the inward parts of the said tail.

I continued my observations on these little creatures, even after they were grown so far from a Worm to a Frog, as that they began to leap in the Fields, and then also discover'd a vast number of small conduits, which by their many and continued windings made up those Vessels, that are commonly called Arteries and Veins. But I perceiv'd the circulation in no part of these Frogs so sensibly, as at the end of the Toes, where the flesh rises more eminently. There these conduits are in so great number, and make so many windings, that my Eye could not follow them; besides, they were so small and narrow, that they let pass but one particle of blood at a time. But when I came to view those about the first or second joint, I perceived bigger Vessels, wherein the blood began to grow red. And 'tis worth taking notice, that I made these observations without cutting the young Frogs, but placing them entire and alive before the Microscope.

I found at first more difficulty to discover the circulation of the blood in green Frogs, but at last it succeeded in them too. And what is most remarkable is, that I perceived the blood of an Artery, big enough to let pass three globules of blood, running back for four seconds, and then following its ordinary course. For instance in the great Artery N P R O, the natural course of the blood is from N to O, and therefore that of the branch P Q ought to be from P to Q; whereas it happen'd sometimes that its course was stop'd on a sudden, and even that it ran backwards from Q to P, and empty'd itself in the Artery N P R O. The cause of this Phænomenon I suppose to have been, either some stoppage of the blood

in the Artery P Q, or in the branches into which it subdivides itself, or perhaps some strange compression of the muscles or sinews, lying next to these small conduits; that hinder'd the course of the blood, and even made it flow back for a short time, after which it pursued its course as vigorously as before.

In another Artery much like to the former, I observed the course of the blood retarded for a short while, whereupon followed a sudden propulsion: then the blood grew slower; then it was pushed forward again, and after five or six such reciprocal stops and propulsions, the blood took again a swift and even course; and all this in the space of a minute, or less.

Mr. Leeuwenhoek being so deservedly famous in the learned World; the Ingenious will undoubtedly be glad to have an account of him. He is about 50 years of age, but has already employed 15 or 20 years in Observations as curious as these, which I have here related. His Parents designed him for a Chyrurgeon, which Profession he has exercised some time with Honor. And as he rightly conceived, that Anatomy was the foundation of that useful Art, and that Microscopes were highly serviceable to acquire the knowledge of it, he applied himself not only to perfect those that were already in use, but even to invent new ones, in which he has succeeded to admiration, having discovered amongst other things more kinds of invisible Animals, than the World before him knew there were visible ones: and withal made an anatomical description of many of them. The perfection to which he has brought his Microscopes, has afforded him great light. For they are not big and cumbersome tools, as the ordinary ones; but light and portable, consisting only of a glass or two at the end of a small and short tube, so that he may manage them, and apply them to the object, as easily as his own Eyes. And what is still more wonderful is, That tho his Glasses magnify the Objects far beyond any I have seen, yet they do not darken it. To which if it be added, that he is an able Surgeon, and has made it his chief business during many years to dissect and view little Animals, Plants, Seeds, Eggs, Saps and the like, his surprizing discoveries will become more credible. I know some are apt to imagine, that this curious Observer of Nature imposes at least upon himself, in several things which appear to them undiscernible. But as to the matter of fact he relates, I dare answer for his sincerity, having myself tried his Microscopes, viewed several things through them, and found them conformable to his relations. Besides, he is very free to let Objects be viewed through his Glasses, and to communicate his Observations to Gentlemen of Learning and Credit, especially Travellers: but he has made so many of them at all seasons and times of the year, that the Thousandth part cannot be examined by those that repair to him on that account. There is a Volume of his Observations printed in Latin, some of which are inserted in the Philosophical Transactions,

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and I have by me some other very curious, which I shall publish in due time.

The discovery he has made in the Letter, I give now to the Public, will perhaps not appear very new to those that do but slightly consider things of this nature. But the Learned know we were sure of the circulation of the blood, rather by reasoning than by experience. The Arteries and the Veins had been observed to have communication together, the Arteries to carry the blood from the heart, and the Veins to bring it back to it: But how the great Arteries divided themselves into small conduits, and these again into smaller, to spread and refine the blood, and bring nourishment and substance to all the parts of the body: How these little channels after several windings discharged the blood into the Veins, to be carry'd back to the heart, and how the blood grew red by degrees, by the junction of several of its primary globules, is what was only, or at least chiefly, known by conjecture.

We are pretty certain that Fountains and Rivers owe their original to the Sea, into which they empty themselves by a continual circulation. But whether they are supplied by Vapors and Rains, or by the steams of subterraneous Waters is still controverted amongst Philosophers. It's somewhat to prove, as (a) See my ingenious Friend has done (a), that the gravity of the Atmosphere hinders the rising of the water above its level, as effectually as would do a floor of Quick silver 28. inches in thickness and weight: so that it is no wonder that in subterraneous channels, where the water is freed from that pressure, it should rise to the top of Mountains, being still lighter than the ground under it. But how should we repay him, who should shew us some of these Channels, and let us view the water ascending from the Sea to the spring of Rivers, as far as the Ocean is from the source of the Rhine? It's what Mr. Leeuwenhoeck has done, as to the circulation of the blood, as the Reader may judge by this Letter, tho what he has seen be but an essay of what shall follow hereafter.

May 23d.

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LETTER XX.

To Mr. R. Sault.

A R G U M E N T.

Occasion of this Letter. The Matter of Fact cleared from all doubts as to the discovery of a Murther made at Lyons. Why the French Court endeavors to cry down the credit of James Aymar? The prodigious Numerousness of the Effluvioms of living Creatures. Instances of the wonderful effects they can produce by their vast Numbers; of their working on living bodies without an immediate Application; of their affecting some Persons, and not others. Why Aymar can trace out Murtherers on a River, tho Set-hounds lose the scent of a Deer, when it crosses the Water? Why these Effluvioms are not carry'd away by the Wind? Whether the Confession of the Criminal diminishes the credit of the Relation, as to the Discovery?

S I R,

TH O I should only follow the rule I have prescribed to myself, to dedicate none of these Letters but to Gentlemen of Merit and Learning, with whom I have the honor to be acquainted; yet knowing you to be a good Philosopher and Mathematician, you have consequently a natural right to some of them. But besides that, I am informed, that I have to you a particular, tho very private obligation, it being credibly reported, that you are the chief Author of some weekly Papers, in which that part of my *Memoirs* relating to the Divining Wand, is honorably mentioned. I might in requital tell the world that there are some pieces of yours, especially your Dialogues concerning the Existence of God, and the Immortality

ality of the Soul, which are as methodical, strong and ingenious, as any I ever read. But tho in this I should not injure the truth, yet your modesty would suffer thereby, and it might look like a correspondence amongst Authors, who cast praises at one another, as Players do a Ball in a Tennis Court.

And therefore, since you have been pleas'd to refer the curious to me, as being the first in this Country, who has pretended to give a philosophical account of this surprizing Phænomenon; I think it more proper to afford you and the public all the satisfaction that possibly I can. First then as to the matter of fact, I heard of it two months before *February* last; and tho at the reading of the first relation I was pretty neer persuaded of the truth of the story; yet it appear'd so strange to me, that I thought it fit to wait a further confirmation. So that before I committed it to writing, I confronted no less than four relations, all drawn by different hands, and varying in some little circumstances, tho agreeing in the main. And as this agreement convinced me of the truth of the report in general, so those inconsiderable variations made it evident to me that there was no plot in the case.

Besides this, I knew the tenderness and care of the Magistrates of *Lyons*, as to what concerns mens lives, they having deliver'd me from the hands of the persecutors of our Religion, and releas'd me, without any ignominious usage, no not so much as a fine, tho I was prisoner at the Kings suit, and threatned with no less than the Gallies, or a perpetual imprisonment. Add to this, that I was certainly informed the matter of fact was so little doubted in *France*, that several learned Eye-witnesses, Physicians and Philosophers, had already written, or were writing upon it.

I let you judge, Sir, and all impartial Readers, whether, after all this, it may be said that I have suffer'd my self to be impos'd upon, to have occasion to deliver some glittering conjectures? But, reply they, *Monsieur le Prince* has examin'd this *James Aymar*, and found that he was a meer Cheat. What? that he had blinded the Court of Justice, and the whole College of Physicians of *Lyons*; who by all the motives of Conscience and Honour were so much concerned to examine the matter, and not to suffer themselves to be made a laughing-stock to the World? If so, surely *James Aymar* must be a shrewd Country-man; and 'tis withal very strange, that being so crafty, he could not deceive his Highness, to whom the Relations we have of the *French* Court, give rather the Character of *Achilles* than *Ulysses*. And what is yet more wonderful is, that a person of that quality should descend so low as to accompany *Aymar*

(a) See
Feb. p. 35.

to places, where it was pretended that Murthers and Robberies had been committed. Nay, the *French* King himself would needs have him to *Versailles*, and his Royal Brother to *Chantilly*, to try the vertue of the Divining Wand. But most unhappily the Wand would not turn at their presence, if we may believe a Letter inserted in the *Journal of Paris*, 1693. N. 16. This extraordinary care, joyn'd to an unwary expression in the said Letter, *That Mr. le Prince doubted of the vertue ascribed to the Wand of Aymar*; would tempt one to believe that those great Politicians, whom specious pretences of State prompt so often to make a man privately away, do not think fit to let grow the reputation of a discoverer of Murthers. And therefore that the same prudence that hinder'd our Peasant from making use of his Wand in the Camp of *Sablon*(a), suggested him not to let it play before such powerful men, who appeared unwilling to be clear'd of their doubts. I might also surmize the great and sudden alterations which fear produces in mens bodies, so far as to benum their senses, that they cannot perceive sensible objects at a competent distance; much more then will this passion, heightned by an eminent danger, and the presence of a King or Prince, stop or alter the pores of a man, when they require such a nice and particular texture, to be sensible of effluvioms, which do not affect other persons. But I need not to be so inquisitive, for the testimony of the Physicians of *Lyons*, and of the Witnesses who accompany'd *Aymar*, during his tracing out of the Murtherers, being still unshaken, and the Judgment of the Presidial of that City having not been reversed by the Parliament of *Paris*, as it would undoubtedly have been, had the *French* Court been able to find fault with it, this discovery remains incontestable. And thus I have as much as I can desire: For whether this Countryman has lost his gift by some sudden fear or distemper, or whether his simplicity has been abused, is what I am not concerned to examine. I own I related the History of *Lyons* in such a way as shew'd that I was perswaded of it; and it would have been ridiculous in me to trouble my self or the Reader with the Physical explication of a Fable. But one single instance being as good as a thousand to ground my conjectures, if that history be true, my endeavours cannot but be commendable.

The objections that have been made against my explication may be reduced to these 4 heads. 1. Why these effluvioms are so powerful as to disturb this Peasant, and by that disturbance to direct him to the way of the Murtherers? 2. Why they do affect him and not others? 3. How he can follow the Criminals upon a River, since the best Set-hounds lose the scent of a Deer when it crosses the Wa-

ter? 4. How it comes to pass that the Air being a fluid, these steams are not carry'd away with it, or at least cast down to the ground, but remain floating for several days and months, almost in the same place where they had been exhaled.

I have answer'd or prevented most of these objections in my VI Letter, and am loth to repeat the same things over and over. However, that I may clear this matter once for all, I shall endeavour to say something new to each of these questions, as far as the compass of these Memoirs will allow.

1. As to the first, Why these *effluvia* are so powerful? I answer, because they are very numerous, which appears, 1. by the quantity of the food we take in every day, whereof 3 parts in 4, and in some persons 7 in 8 are exhaled in steams. 2. Their numerousness is increas'd by their extraordinary minuteness: for if you remember what Mr. *Leeuwenhoek* has observed and made sensible in the foregoing Letter, there are Conduits in living bodies so very small, that they only admit one single globule of Blood, whereof ten thousand together would hardly amount to the bigness of a large grain of Sand. 3. And yet the particles that are expell'd out of living bodies must be still smaller than the minutest globule of blood; for they cannot be driven away but by corpuscles that are stronger and bigger than they are.

Now that corpuscles, otherwise very weak and small, can by their vast numbers produce wonderful effects, appears by a thousand instances, of which I shall only quote this single, but very sensible one. Take a Rope, with a hundred pound weight hanging at the lower end of it, and suspend it in an open place so, that the weight having stretch'd the Rope as far as it can, it does but just touch the ground; if there happen a small and thick rain (as is very usual in this Country) that thoroughly wets the Rope, you shall observe it to shrink, and to lift up the weight at a considerable distance from the earth, as two or three fingers broad, and even keep it up, till the Rope drying by degrees, the weight stretches it again to the ground. So that the weakest body that we know of, *viz.* the small drops of common water, creeping into the pores of the rope, and swelling the threds of the hemp, can by their numerousness raise up a weight, which neither the wind, nor a man of mean force, would be able to move.

But it will be objected, that the drops of rain swell and shrink the rope by an immediate and sensible application, whereas we see no such communication of the effluxes of the Murtherers into the body of the Discoverer. But must we deny whatever is not visible?

See p. 37.

ble? then we must doubt even of the effects of the wind, tho it throws down Houses, and plucks up Trees by the root, and ascribe it to some occult quality. The application of these steams is sensible enough, since it so mightily disturbs our Country-man, and is withal immediate, tho the corpuscles of the air serve as vehicles to them, and that they be kept and preserved in their hollow blades. For they display their virtue as soon as they are entred the pores of the Discoverer, and that as quick and even quicker than any other venom.

If it be urged that the ordinary quantity of our daily food can never produce such a vast number of steams as is supposed in this hypothesis: I answer, that the aliments we use are very compact bodies, which, being reduced into fumes, will fill a space a thousand times bigger than that which they took up in the state of bread, meat or drink. This appears by the instance of an *Aeolipile*, wherein an ounce of common water heated on a Chaffingdish, will emit vapours of 20 or 25 inches in length, and an inch diameter about the upper end, during 16 or 18 minutes. And I doubt not but bread, as it's more compact, will also take up a far greater space, when reduced into exhalations; since a pipe of Tobacco, which is hardly the 12th or 16th part of an ounce, casts forth such a prodigious quantity of smoak, as fills a whole house with the smell, and would make up many score Yards, if it could be measured: besides a vast number of spirituous and oily particles that enter into the body of the Smoaker, or stick at his Pipe, and a considerable deal of *Caput mortuum*, and Ashes.

II. As to the second question, why these *Effluvia* do affect this Peasant, and not other men: I answer, That it is an effect of the wise Providence of God, that the emanations of an Animal are for the most part not hurtful to others; since it is evident that in such a case they could not long subsist. But some occasions wherein the same Wisdom has thought fit to give them repugnant qualities, are sufficient to shew the power of their effluxes. I shall not insist on what is related by ancient Authors of the *Basilisk*, that it darts its venom by its Eyes, that its steams kill the greatest Serpents, and even those Persons who touch it with a long Pole; that it burns the Herbs, and dissolves the Stones over which it passes. I easily grant that some fictions may have been suffered to pass under the countenance of so strange a truth, but am loath to take the whole relation for a fable, not only by reason of the authority of *Galien*, *Ælianus*, and *Pliny*, but especially because the last who was accounted so credulous, begins to get in greater credit than ever, since our latter navigations and experiments have manifested the truth of many of his Relations.

What

What is reported, by *Cicero* and *Pliny*, of the *Torpedo*, or Cramp-fish, is not so much contested, and will do as well for my purpose. This Fish is not very nimble, but compensates its natural heaviness by craft, for it hides itself in the mud that lies on the bottom of the water, as tho it knew that its steams have the power to benum the fishes that shall chance to pass over it, and that then it may come and devour them at leisure. It's farther observed that this fish is not to be kill'd but at a distance, and with arrows and guns, for if you venture to touch it, tho it be with a long pearch, it will presently cramp your arm.

I might add other instances of the effluvioms of animals working on living bodies, without an immediate application of the agent to the patient, as what is related by *Piso* in his History of *Brasile*, l. 5. c. 14. of another sort of Cramp-fish called by the Natives *Amorea-tim*, which if a fisher chance to tread upon, tho he have shoes on his Feet, yet he will presently be seized with a kind of *Paralysis* and stupefaction. And *Scaliger* * testifies that in *Gascony* his Country, (*) *Exercit. 186.* there are Spiders of that virulency, that if a man crush them, their poison will pass through the very sole of his Shoes.

But it will still be surmiz'd, That these steams are poysonous in themselves, and to all animals whatsoever; whereas the effluvioms of the Murtherers require a particular texture in the Patient to become sensible to him. I grant it, but instances of this are likewise to be found. Pray, Sir, what teaches a young Dove or a Lamb to fly from a Hawk, or a Wolf, tho the young Beasts never saw their Enemies before. You never heard of an unexperienc'd Child running from a Viper, or a Wild Beast, unless it be terrified with their whistlings and howlings. But tho a Wolf endeavors to approach a Lamb in a soft and deceitful manner, yet the innocent Creature does not sooner smell or perceive the rapacious animal, but it makes away with all the haste it can. I know what is used to be said in this occasion, That the imagination of the Sheep, Mother to the Lamb, having been often frighted with the image of a Wolf, has imprinted the same horror on the brains of her young. This is something, indeed, tho it had withal to hold true in Children, in reference to things that are hurtful to man, which however it does not. But let's take this for a sufficient answer; I ask still what is't that advertises the Lamb, that it is in the presence of the Wolf, especially when it does not see it. Certainly it can be nothing else, but the smell of its Enemies emanations. And therefore there are emanations which are hurtful to some Animals, whilst they do not affect others. But we need not go farther than our

own houses to find the like instances; for those places, which our Cats use to frequent, are soon deserted by Rats and Mice, the smell is so noisom or frightful to those insects.

I should never have done, should I speak in particular of the aversion which some have for the smell of old Cheese, of Tobacco, and even of Musk, Ambre greese and Roses. And therefore I shall conclude this Article with observing, that tho' I cannot give a proper and particular description of the figure and shape of these odoriferous Corpuscles, nor of the Pores they are receiv'd in: yet this is sufficient to infer that the Pores of humane bodies are very different, since what operates on some will have no effect on others. Not to add that the weakness of ones temper makes his body very sensible, as Children, Ladies, and sickly persons use to be offended at several things, which men of a stronger constitution and inured to pain and labour do not take notice of; and some diseases refine the hearing to that degree, that the Patient perceives the least noise that is made in the house: as I have had sometimes my smell rendred so nice and tender by the head-ach, that I could not walk through the streets, the odours I met with at every step were so troublesome to me. I am credibly informed that in a long Sea fight, wounded Souldiers, especially such as have had any bones broken, do oft complain of the torment they are put into, by the shake they feel at the going off of the Enemies Cannon. And the learned *Simon*

(a) *De Fe-* *Paulsen* testifies (a) that the same hapned to one who had lost his
bribus ma- right Arm by the Gangreen. For he cry'd out most lamentably at
lignis. p. 71 every time that a great Gun was discharged, tho' he was in a Coun-
try house, and so far from the Sea, that the report of those Cannons
could hardly be heard by the Persons that were near him. *Platerus*

(b) *Observ.* relates an observation, which is still more surprizing: (b) A woman
l. i. p. 185. fell into a sudden sickness, and Nature failing her as in an instant,
she perpetually groan'd, that she was choaked, tho' there appear'd
no signs either of snorting or coughing. She especially complained
of a wind that came upon and oppressed her; if any of the Assist-
ants mov'd but ever so little. But when any came near her, then
she cry'd out that they smothered her. She lived but two days in
that perplexity and so died.

It will be excepted against the two last instances, that these effects
are produc'd by the motion of the air, and not by any emanati-
ons. But besides that in the former, the air is mov'd by the va-
pors of the Gunpowder, and in the latter by the effluxes of Men;
it suffices for my present design, *viz.* to render a pertinent reason
why the effluvioms of Murtherers affect this Peasant, and not other
persons.

persons, that I prove that an unheeded motion and insensible corpuscles are able to produce violent and surprizing effects in humane bodies, when disposed some certain way.

III. It's no hard matter to resolve the third Objection, *That Set-hounds lose the scent of a Hare or a Fox, when it crosses the Water, and therefore that it's not conceivable how Aymar could follow the Murtherers on the Rhone.* For 1. Set-hounds hunt out Beasts of Game only with their Nose, in which they receive the corpuscles that steam out of the Feet of those Beasts. But our Countryman traces out Murtherers by the emanations that exhale out of all the parts of their body, and penetrate through all the pores of his own, and perhaps too, in those of his Wand. 2. A Hare or Fox swims over the water, that must needs carry its effluxes away; but Men go over a River in a Boat, so that their effluvia may as easily disperse themselves through the air that lyes on the surface of the Water, as through that which floats near the ground, and none are lost but some few, that now and then are cast down; which however is the cause why *Aymar* is not so vehemently affected, when he pursues Murtherers on a River, than when he traces them out on land (a). p. 41. See

IV. But the last and grand Objection is, *How these effluvia may lie hidden so long within the hollownes of the aerial blades.* In vain I have supposed, and even demonstrated, as far as such matters can be, that these steams are extraordinary small and rigid, ponderous and clammy: this cannot satisfy some People, who seem to imagine the air as a River, that runs perpetually from East to West. But to grow more favorable to my hypothesis, they have only to substitute to their River a vast Lake, or rather an Ocean, which will afford a truer Idea of the Atmosphere, especially, if they conceive no tides in it, or at least neither Capes nor Coasts to vary its course. Now tho the particles of this Ocean be in a perpetual motion, tho they may be by the Wind raised up, and cast downwards, toss'd to and fro, and even propelled North and South, East and West, to a considerable distance; yet this World being full, or almost full, they cannot stray very far, or at least very long, from the usual place of their abode; but will soon reflow to it. Thence it comes that contrary Winds do ordinarily succeed each other, and that the air of the respective places remains still almost the same, save the usual difference of seasons.

Add to this, That Bodies cannot be driven forward but by Bodies stronger than they are; and that amongst the aerial blades, those are doubtless the strongest and least moveable, which are replenished with these hard and ponderous effluvia. Thence it will follow

low that when the Wind puts a certain part of the air into motion, its empty corpuscles are either repell'd back, or forced to glide along the sides of the full ones, which therefore keep still constantly their place.

If it be objected that the replenish'd blades being so heavy, ought to fall immediately to the ground. I answer that they may be hard and ponderous enough to resist the soft impression of the empty corpuscles that swim about 'em, without having a weight sufficient to force upwards the whole column of the air that underprops them.

I might add instances of contagious steams preserved a very long time in several moveables, but I need not to be so precise, for I only undertook to defend the Relation of *Lyons*, in that part relating to the Discovery of the Murtherers, which was made a few days after the crime had been committed, and appeared to me undeniable by reason of the sentence of the Presidial, and the Testimony of the Physicians of that City. Some of the incredulous, to save the honor of the Court, say that they condemned the Criminal upon his own Confession. I grant that he confessed, tho' not at first, but when he could no longer resist the pressing evidence of all the Landlords at whom he had lodged in his flight: So that his very confession which he made, without being so much as threatned with the Rack, is a strong proof of the truth of the Discovery.

I am sensible that all the reasons and instances of this, and of my former Letters, will not perswade some Pietenders to Philosophy, who measure the vast extension of possibilities by the shallowness of their conceptions, or who, to appear learned and subtile, at a few expences, cut short, through all the difficulties by a denial of whatsoever they can give no good account of. But I hope a more ingenuous usage from you, Sir, who are accustomed to consult Reason, free from passion of Prejudice, and even, as I am informed, are going to enrich the World with a new art of reasoning, grounded upon the sure and unshaken Principles of *Algebra*.

May 29th.

F I N I S.

MEMOIRS FOR THE INGENIOUS.

CONTAINING

Several Curious Observations in *Philosophy*,
Mathematicks, *Physick*, *History*, *Philology*, and
other Arts and Sciences.

IN
Miscellaneous Letters.

By J. D E L A C R O S E, Eccl. Angl. Presb.

J U N E, 1693.

To be continued Monthly.

V. O L. I.

*Η γὰρ σιωπὴ τιμὰ δὲ τὰ ἀρρήτα, ἢ ἐνσεβᾶς, ἀειθμεῖ δὲ τὰ ἅγια. *Either let the inexpressible Mysteries be silently reverenc'd, or let these Holy things be religiously discours'd of.* Basilus Lib. de Spiritu Sancto ad Amphilochem, c. 18.

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Where are to be had the Memoirs for *January*, *February*, *March*,
April and *May*.

MEMORIAL

TO THE

LEGISLATURE

OF THE STATE

OF NEW YORK
IN SENATE
JANUARY 18, 1882

REPORT

OF THE

COMMISSIONERS

OF THE LAND OFFICE

IN

RESPONSE TO A RESOLUTION
PASSED BY THE SENATE
JANUARY 18, 1882

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Memoirs for the Ingenious.

JUNE, 1693.

LETTER XXI.

To the Honourable Sir Robert Southwell,
President of the Royal Society.

ARGUMENT.

Continuation of the Second Letter of these Memoirs. Objections against the Hypothesis propos'd there for the Formation and Drowning of the Earth, answer'd. That nothing compels us to believe there were so many, and so high Mountains before the Deluge, as there are now. How those that then were may have been formed. That a Circulation of the Water as swift as that which is requir'd to render the reason of Moses's Account, is not impossible : Two Conjectures proposed. Several Causes that may have concurred to change the Center of Gravity in the Terraqueous Globe. Uncertainty of the Dynasties of the Ægyptians, and of the Chinese History and Chronology. Mr. Newton's Opinion, that the Earth would be still in danger of being drown'd, were it not higher at the Equator, than 'tis at the Poles.

Honourable Sir,

I Had so mean an Opinion of my Conjectures concerning the formation and drowning of the Earth, that in 4 months time, I did not vouchsafe to cast my Eyes again upon them. They were conceiv'd and brought

A a

brought

brought forth in one morning, and if I be to blame, 'tis especially to have expos'd such an adventurous birth, on the public stage, under the protection of a person of your merit, who thinks fit to raise the luster of his quality with the brightness of Sciences, and to wear away the troubles which so many great concerns and imployments may give him, with the charming Study of Philosophy, and the profitable improvement of natural knowledge.

And now, Sir, that I am inform'd 'tis the opinion of many learned, that this untimely birth might become an hopeful Child, if I took care of its education, and chiefly if I could remove some obstacles, which hinder its growth and advancement; 'tis the least, methinks, that I can do for Your Honor, and withal for my self and the love of the truth, to examine whether these difficulties are altogether insuperable.

The objections that have been made against my Hypothesis may be reduc'd to three heads; the formation of Mountains, the sudden circulation of the Waters, and the Earth losing its *Equilibrium*.

I. As to the first, it is urg'd that by my supposition of the grossest particles of the terraqueous Globe, subsiding unevenly upon one another, and the waters making their way and digging the Channel of Rivers through them, some small Hills and Hillocks may indeed have been form'd, but not those vast and long ridges of high Mountains and Rocks, which are now in being, and seem to have preceded the universal Flood, by those two passages; *Before the Mountains were brought forth --- thou art God, Psalm. 90. 2. Thou coverd'st the Earth with the Deep as with a Garment; the Waters stood above the Mountains, Psal. 104. 6.*

In answer to which, I observe, 1. That I have given no determinate height to Mountains, as indeed they have none, being liable to a perpetual increase and decrease; so that tho the term in the Original, which we have translated *Mountains*, should signify only the highest Hills; yet the aforesaid passages would not hurt my Hypothesis. But

2. The word *הרים* *harim*, is us'd for all sorts of Mountains indifferently, whether high or low, and more commonly for the latter, and likewise only imploy'd in the History of the Flood; whereas the *Hebrews* make a more ordinary use of *גבעה* *Gibbah* to denote high and great Hills, see *Gen. 49. 26.* Add to this, that the passage of *Psal. 104.* may as well be understood of the Deluge, as of the first Creation.

3. Tho we cannot precisely describe the first delineation and frame of this World, yet some propositions may be form'd thereabouts,

abouts, which have a great degree of certainty. As

1. That the first Matter is not an uniform mass, as the *Peripateticks* and the *Cartesians* pretend; or if it have ever been so, that it could not be employed in the formation of the World, before the Sovereign Creator had divided it into innumerable particles, and endued them with several qualities, in some cases so different from each other, that, for instance, the corpuscles, which make the essential part of precious Stones and Metals, can never become the seed of Plants and Animals.

I am confirmed in my opinion by that famous passage, *That the Spirit of God moved upon the face of the Waters*, which at the beginning covered the Earth, that is, according to the force of the original term, מְרַחֵפֶת *Merachepeth*, that the Spirit of God was brooding the terraqueous Globe. A circumstance, which that wise and inspir'd Historian would never have observed, in this short and ponderous abridgment, had it not been to let us understand, that that inform and inordinate Mass could never frame itself into this most beautiful World, by what motion soever it were put in: But that it was necessary God should prepare things before-hand; and then at the first motion the mighty Springs, that were ready, began to display their Virtues, and to dispose the Creatures into that pompous and magnificent order, which makes the admiration of intelligent Beings.

Good Microscopes assure us, That the smallest Insects have as perfect Organs, and fit for the ends they are created, as the biggest Animals: That the blood, or at least a vivifying sap circulates in them; whence follows, That they have Veins and Arteries; That they move, and therefore must have something like Muscles and Nerves; That they live and grow, and consequently must have fibres too. And now if there be nothing else in Matter besides extension, figure and motion, let the *Cartesians* tell us by what complication of those qualities life can be produc'd; or what are the rules of motion that concur to the formation of Plants and Animals, and their pertuation, by unalterable seeds.

2. Matter is essentially heavy, and all the particles which it is made of tend to a certain center^(a).

(a) See Lett. 15. p.

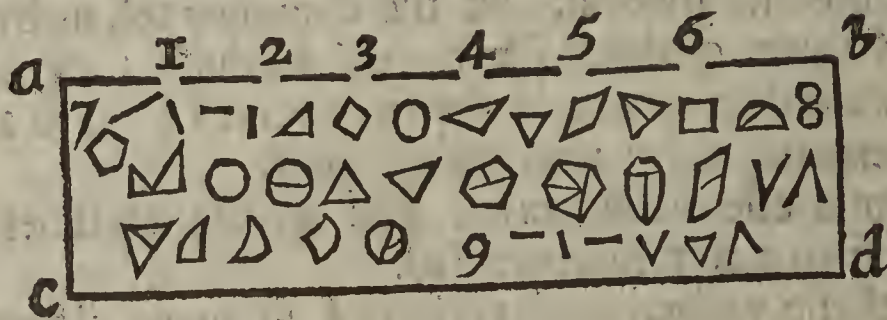
3. Out of the various conjunction of so many different particles must necessarily result an indefinite variety of compounds. For if in Music, out of seven notes, and at the utmost five Octaves or forty Tunes, arise so many different songs, consorts and harmonies; if out of 24 Letters, and at the utmost 40 simple sounds, all the languages of the World are form'd; what prodigious diversity must produce

112.

so many various complications of so many sorts of material corpuscles?

4. When God thought fit to order the Creatures of this sublunary World (for of the others we can speak but at random) it may be conceiv'd that he gave a violent motion to the Terraqueous Globe, so that it turned about its own Center, perhaps twice in an hour. This put all its parts in agitation, and prepared them to disentangle from each other. And as this mass was composed of several corpuscles, which meeting together produce a sudden fermentation, as Metals, Minerals, Oils, Liquors, &c. the fumes of these fermentations, and withal the most subtile particles of the Chaos were the first that loosened their bands, and raised to make up the Ether and the Air: Then followed the watery; the oily, tho lighter, not being able to disintricate themselves so soon, by reason of their many branches; and the motion abating insensibly, the grossest particles subsided towards the Center, proportionably to the degrees of their bigness and gravity, the lightest corpuscles of the Earth mingled with the oily rising towards the superficies of the Globe.

It's observable that the grossest particles could not subside so evenly, as to make regular beds within, and a smooth surface without, both because of their various and irregular figures, as that the motion did never entirely cease; since according to the *Copernican System*, the most probable of all, the terraqueous Globe turns still about it's own center once in 24 hours, and is carried about the Sun once in a year. Besides that the hollowness within, and the eminencies without, may have been increased by a thousand accidents, especially by the continual gravitation of the particles of the Earth. For let



the Parallelogram *a b c d*, be a Bed of Earth, whose outside may be smooth, if you please, but divisible at the numbers 1, 2, 3, 4, 5, 6. Let the inside be filled with irregular corpuscles, as 7, 8, 9, that leave many spaces amongst 'em, either void, or replenish'd only with

with a yielding matter: If there happen a violent Rain, a Fermentation, an Earthquake, or any other extraordinary Motion, so that the inward parts 7, 8, 9, be raised or subside, or that the surface *a b*, be depressed at some of the numbers 1, 2, 3, 4, 5, 6, there will arise sudden yawnings, that is, new Eminencies, Hillocks and Valleys; for as the smallest, and primary beds of Earth are compos'd of irregular particles; so the greatest beds are made up of lesser and uneven beds.

This being suppos'd, if the first superficies of the Earth had been as smooth and level as *Descartes* and Dr. *Burnet* pretend, it would be a wonder no less surprizing, than if now the faces of Men were all alike, notwithstanding the diversity of their Generation and Temperament. True it is, that as Children resemble more one another, than full grown men, because age, passions and accidents change the lineaments of their face; so the superficies of the Earth was not perhaps in its infancy as irregular as it is now: however the mechanical necessity of its formation includes so many inequalities, and the subsequent Inundations and Earthquakes have made so many alterations, that they suffice to justify what the Holy Writ teaches us of Mountains before the Deluge, and to render an account of the present constitution of the Earth, without having recourse to the bursting or cracking of its exterior crust, and its falling into the Abyss.

If it be urg'd that according to this supposition, the superficies of the Earth ought to change every day: I answer, that it does so too, as may be prov'd by a thousand instances; tho the alterations cannot be so frequent and sensible as they were at the beginning, the Earth having in 4 or 5 thousand years taken a consistency, which it had not in its prime youth.

II. As to the circulation of the waters it may be objected, that my Hypothesis making them surround the terrestrial Globe, they were then so far from the Equator, that they could not run back to those parts in so short a time as the six days Creation. To solve this difficulty, it must be considered that the Globe being divided in 360 degrees, each of which contains 48 *English* Miles, according to the usual computation, its whole circuit amounts to 17280, its superficies to 298596400, its diameter to 5499, its semi-diameter to 2749 $\frac{1}{2}$ *English* Miles. The extent of the water is reck'ned equal, or very near to that of the land; but because a Circle or Sphere is broader towards its circumference, than towards its Center, we shall take off but a third of the semidiameter for that part that was covered with water, and there will remain only 1833 Miles of Land. Now allowing 167 Miles for the Windings and ascending of the Water, the whole...

whole will amount but to 2000 Miles, that the water had to run from the borders of the Sea to the very top of the Equator, which is not an extraordinary length, considering that there are still Rivers whose course is very near as long, such as the *Danube*, the *Volga*, the *Tanaïs*, the *Oby*, the *Ganges*, the *Indus*, the River of *S. Laurence*, *Rio de la Plata*, the *Nile*, but especially the *Niger*, which waters the greatest part of *Africk*, during 2400 miles.

However, will it be said, this extent is yet too vastly great, that the circulation might be compleated in four or five days; for experience teaches us, that waters flowing through small Channels, as the subterraneous must needs be, has not a sufficient rapidity to run over so long a space in so short a time; nevertheless it appears by the description that *Moses* makes of the Terrestrial Paradise, that the Rivers had a settled course immediately after the Creation. Tho' I should grant all this to be true, I should not be more concerned in the solution of this difficulty, than other Divines; since 'tis plain by the Sacred History, that the place of this delightful Garden was so far from the Sea, as to render the said circulation as improbable in the common system as 'tis in mine; so that this objection serves only to overthrow the *Cartesian* Hypothesis, by shewing that this World has not been formed by the present laws of motion, or that the same quantity of motion, that was imprinted on Matter at the beginning, has not been preserv'd hitherto.

But this objection, which, if I be not mistaken, would puzzle the best *Cartesian* in the world, may be easily solved by the Principles laid down before. The blood is supposed to circulate through our Veins and Arteries 48 times in an hour, so that in a man of mean stature, it runs over a space of 480 foot in an hour, 11520 foot, or 3456 steps in a day, that is about 3 *English* miles. The Earth being such a vast body in comparison of ours, and the subterraneous channels incomparably bigger than so many small and imperceptible conduits through which the blood flows, it will be but a reasonable supposition to ascribe to the returning water a course 4 times swifter, that is, 12 miles. Now supposing, that to disentangle the parts of the Chaos from each other, God gave to the terraqueous Globe a motion 40 times swifter than is now its daily rotation, it follows that the subterraneous water ran over a space of 480 miles in a day, and that at the end of the five days it had made its way through 2400 miles, which come to more than we had occasion for.

But because in this supposition, the Sun ought to appear rising and setting 40 times in the space of a natural day, whereas *Moses* expressly says,

says, that *the Evening and the Morning were the first, the second day, &c.* I will not lay any stress upon this conjecture. I might answer that there were then no animals endued with an intelligent substance to measure the course of the Planets, and therefore the sacred Historian speaks of that time, according to our present notions. But I am so afraid of any seeming contradiction with the Holy Writ, that I rather chuse to stand by another answer, which I have ready at hand. For let it be how it will, these conclusions at least are sure:

1. That the motion of a liquid, especially so simple as common water, can be extraordinarily increased. 2. That the motion of the waters was really so, they being made to run down towards the sides of the Globe, with such a precipitancy, that on the same day, *viz.* the third, when God said, *Let the Waters under the Heaven be gathered together unto one place.* [Pray, observe this expression by the by, which shews, that the Sea did not then cut the Land into so many Islands, Peninsulas and Continents] that very day, I say, the Earth brought forth Grass, Herbs yielding Seeds, Fruit-trees, &c.

3. That the water ascends as high as it descends low; and with the same swiftness. I have seen myself (a) water-spouts rising higher than the highest Pine or Fir-trees, because they came from a Cascade hard by that fell from about the same height that the water-spouts arose. 4. It is not exactly true that that water runs not so swift through narrow Channels as through broad. Experience evinces the contrary for there are small Rivers more violent than large ones; so that the swiftness of their course depends on other causes, *viz.* the height of their Source, the declivity of the Land, the smoothness or roughness of their Channels, the Winds, &c. tho I grant that, other things being equal, a great River ought to appear more violent than a Rivulet.

5. The Atmosphere not hindring the motion of the subterraneous waters, compensates the opposition which they may receive from the smalness of the Channels, and their ascent to the top of Mountains. 6. The degrees of swiftness in the water under ground must needs be proportioned to those of the water above it: otherwise the Sea would swell, or the Rivers could not be supplied.

III. As to the Earth losing its Equilibrium, it hath been objected that the Center of a Sphere cannot be changed, unless its figure be altered. I grant it, but the Center of gravity may, and must too, as soon as any one of the halves grows lighter or heavier, that is, the Sphere must then lose its former Equilibrium and be librated about another Center. As in the Scheme set down in the second Letter, p. 12, if the Hemisphere ESW grows lighter than the Hemisphere ENW, the Center of Gravity must needs be removed

(a) At
Gieres in
Dauphine
4 Miles
East of
Grenoble.

ved

ved to L, and contrariwise to O, if ENW grows lighter than ESW; or at least to some point of the longest Diameter EW, other than the point H the former Center of the Sphere.

But the greatest difficulty consists in feigning some probable cause of the removing of this Center of gravity. I have there hinted at two by the way, viz. Earthquakes and rain, which seem to me very likely to produce that effect. 1. I have observ'd that there are many Cavities under ground, with minerals and juices contain'd in them that are apt to ferment, when mix'd together. This is the incontestable origin of Earthquakes, by what cause soever they may be afterwards propagated and continued. For as far as I know, there never happen'd an Earthquake, without a foregoing eruption in some part or other of the Globe. 2. The Phenomena that preceeded the Universal flood are not mention'd in the sacred History: But according to the ordinary ways of Providence, I may reasonably suppose that there were many, and amongst others Earthquakes, which hap'ning in divers parts of the Globe, rais'd plenty of exhalations to serve for a store of rain. 3. During that violent commotion, 'tis not improbable that several beds of earth fell down and stop'd many of the subterraneous Channels, so that the water was forced back to the Sea, which must then needs overflow the land. 4. Those many Earthquakes and unusual commotions having rendred the Earth in some manner tottering, the overflowing of the Sea joyn'd to a wind driving the exhalations more plentifully to one side than to the other, and consequently a greater power of Rain falling on that side compleated the overbalancing of the terraqueous Globe and withal its drowning.

If to this you be pleas'd to add the accounts left us by credible Historians, of Hills made up of the Sediments of the Sea, as in *Tuscany*, of the like Sediments found in Valleys, together with shels and bones of Fishes found in Mountains and other places, that are so very remote from the Ocean, that 'tis not probable they should have been carri'd thither by any other means than the universal flood, you will undoubtedly grant that this supposed overflowing of the Sea is something more than a bare conjecture.

(a) See the The Dynasties of the *Egyptians* are altogether fabulous, and the most favourable account that can be given of them is to say that they were reckoned by the Revolutions of the Moon, a Month for a Year. As to the Chronology of the *Chinese*, besides that the Calculation of the *Septuagint*, it's not withal so certain as to stand in competition with the *Hebrew Text*. (a) For about the year 212 before Christ, *Hi hoan ti*, a *Chinese* Emperor order'd all the Books of History and Philosophy

(a) See the
Dissert. of
F. Couplet,
before his
Latin Tran-
slation of
Confucius.
Fol. Paris,
1687.

Philosophy to be burn'd, and all the Learned he could meet with to be buried alive, lest they should partly restore them by memory. He was so punctually obey'd, that of a vast quantity of Books in all sorts of Sciences, which the *Chinese* are said to have had at that time, none escaped his fury besides a copy of *Confucius's* Writings, which a woman preserved by starching them along a Wall, that she caused afterwards to be plaister'd. As to the Learned, the Persecution was so violent, that but a few were saved, and those decrepit Old Men too. Pray, now observe, that the Books of *Confucius* are meerly Philosophical, and that it was but 72 years after, that is, when none of those who had read the ancient Records could be alive, that the Emperor *Vu-ti* pitying the fate of his Country, endeavoured to restore its History by Tradition. Is it probable that those few Old Men, who escaped the bloody rage of *Xi hoam ti*, and who durst hardly usher their thoughts under that cruel Emperor, could remember a sufficient number of Events, Dates and Proper names to make up a compleat History of so many ages? Besides that it was death during those 72 years to write any thing of it; so that they could only transmit to their Friends what they remembred here and there by word of Mouth. Is this a safe way to preserve the truth in Historical and Chronological matters, and can such a lame account stand in competition with the Authority of the Holy Writ, and the General Tradition of Mankind concerning the Universality of the flood?

Some have found fault with me for calling the points of the longest Diameter of our Globe E. W. that is *East* and *West*; because they are two opposite points of the Equator that terminate the longest line. The mistake came from thence, that there are three Diameters in a Globe, whereas but two can be represented in a Planisphere, whose four Cardinal points we use to call *North* and *South*, *East* and *West*. But at last it comes all to one, provided the Earth be set upright on its longest Diameter, as I have represented it in the fore-mention'd Scheme. That incomparable Mathematician Mr. *Newton*, whose authority I could alledge, if Philosophers were to be convinced that way, thinks that even now this situation of our Globe is required to keep the waters down: and therefore the overflowing of the Sea is a necessary consequence of the inclination of the said Globe.

June 14.

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LETTER

LETTER XXII.

To the Right Reverend Father in God
Edward, Lord Bishop of Worcester.

A R G U M E N T.

An Historical Account of the Author's Studies in Holland, and of his publishing here an Essay towards the explication of the Mystery of the Holy Trinity. The Phrase of three distinct infinite Minds or Spirits justified, against the Author of the Animadversions on Dr. Sherlock's Vindication; by Reason, by Scripture, by Passages of the Fathers; by the Condemnation of Praxeas and Sabellius; by the Disputes concerning Consubstantiality, concerning the Words, Hypostasis and Persona, by a Comparison they us'd to signify the distinction of the Divine Persons. The Arguments of the Observer answered. He speaks like a Sabellian. The Exposition of the Fathers in a Council held at Alexandria opposed to his. Why I explain'd the word Person by those of Understanding, Mind or Spirit, and why the Fathers did not use them.

My Lord,

ONE of the chief Reasons, that determin'd me to chuse *England* for the place of my retreat, was the reasonable Liberty which our Church allows to her Divines. I was sensible of the mighty advantages, this method joined to the regularity of her Reformation, had given her in the Controversies against the Papists; whereas other Protestants, who have turned into so many articles of Faith, their particular ways of explaining the Doctrins of Predestination and

and Justification, have been extreamly puzzled by their subtle Antagonists. I foresaw that according to the prediction of *S. Paul*, the Church would never be without Enemies; and that, if God should vouchsafe to bless us so far, as to rid us of those bloody Adversaries, who threatned us with the loss of our temporal and spiritual liberties; we were like to be troubled with others, more civil in appearance, but more dangerous at the bottom, such as the *Socinians* and *Arians*: at least that we should never want Libertines and Atheists to exercise our pens, as well as the patience of the Almighty.

Christian Prudence suggested me to provide my self against a Tempest, which might be nearer than the Vulgar believed: And living at that time in *Holland*, where I had occasion to converse with many persons *Socinially* inclin'd, I perceived that they were of three sorts: The lewd and debauched were Atheists, or did their utmost endeavors to become so: The boldest and learnedst were downright Deists, who look'd on the Holy Scripture as a very ordinary History, and on all sorts of Religions as so many pieces of Policy: The third sort, who were the far greater number, were true *Arminians*, *Arians* or *Socinians*, men for the most part of an honest conversation, tho somewhat too proud and confident, as having so much insight as to discover the objections that may be made against the grand mysteries of our Religion; but wanting a competent deal of learning and application to resolve the same.

As to the first and second sort of Heretics, I always look'd upon their conversion as a miracle of God's Grace; and having no hopes of reclaiming them from their wilful errors, I avoided their conversation as much as possible; or at least any contestation with them, lest my ears should be offended with their intolerable Blasphemies. But as to the last sort, I extreamly pitied their fate, especially when I observed that they were often loath to put a force upon so many passages of the Holy Scripture, as we use to alledge against 'em, and when they own'd to me they would be ready to believe our Mysteries, could we but give any notion of them, and shew their possibility. I was convinc'd within myself that their demands were not altogether unjust; that Languages are made to communicate our thoughts; and that words, which have no determinate sense annexed to them are meer sounds, which as they can raise no distinct Idea in our minds, so they can produce no belief. And therefore laying aside for a while the Books of Systematic Divinity, I applied myself to the meditation of the Holy Writ, the true source and foundation of our Faith; and comparing together the several passages

that relate to the controverted Articles, I framed to myself an Idea of the Holy Trinity, the Hypostatical Union of the two natures in our Savior, his Satisfaction, the Fall of Man, God's Fore knowledge, and Humane Liberty, &c. which Idea's appeared to me intelligible enough, considering their necessary relation to a spiritual and infinite Being.

According as I made these Discoveries, I communicated them to my *Socinians*, who at first wondred at them, then said they would be tempted to receive them, were they the current Doctrin of our Church; but that they were afraid lest I should be look'd upon as a greater Heretic than themselves, if I should presume to divulge them. And therefore I consulted some worthy *Dutch Divines*, of whom the most moderate answer'd me, It were to be wish'd some such course should be taken for the conviction of the *Socinians*: But others on the contrary advis'd me to take care of what I did, it being a dangerous thing to recede from the *ancient Tradition*, for so they call the usual way of teaching. In vain I represented to them, my Hypotheses chang'd nothing in the essential part of the Dogma's, and I did not even so much as reject the received Terms, but only affix'd a determinate Idea to them, that we might understand one another: That the main point was Whether those Idea's were new, or conform to the meaning of the Sacred Writers and the Doctrin of the Christian Church in all ages. This availed but very little with those grave old Men, who are not us'd to be taught by young Students.

Thus after many unsuccessful attempts, I came into this Kingdom, where I had no sooner gotten some smattering of *English*, but I made bold to write down some of my thoughts in that Tongue, and to communicate 'em to the late honorable *Robert Boyle*. That pious man, as able a Divine as great Philosopher, seem'd to be well pleas'd with them, and spoke of them with commendation to several Persons of Merit, as amongst others to my Lord Bp. of *Sarum*. Thence it came, that being once at his Lordships, with some Reverend Divines, and Learned Gentlemen, I was questioned about my Papers, and especially that part which concerned the Holy Trinity. I gave a short account of it, the same in substance which I have since published in my *Essay*, (a) whereupon his Lordship was pleas'd to say, *that there was nothing new*.

(a) Works
of the
Learned,
p. 123.

Monfieur *Jurieu*, and Dr. *Wallis* had lately published an *Essay* towards the explication of that sacred Mystery; but tho this encouraged me to give out mine, by discharging me from the novelty of the attempt, yet it discouraged me in other respects, their thoughts

thoughts being so very different from mine, that I was afraid of being found in an opposition with two so famous and learned Divines.

Then came out Dr. *Sherlock's* Vindication, whose notions being nearer to mine, after so great an example, I made no difficulty of exposing them to the public view; only I thought fit to have them examined by a man of parts and authority: In order to which I made choice of your Lordship, to whom I delivered a copy of my Essay in the *French* Tongue; and some months after when I ask'd your Lordship's opinion of it, and whether it might be translated and printed, your Lordship was pleased to answer that you would not hinder it. I made use of that permission, and published the forementioned Essay, in the Month of *October* of my *Works of the Learned*, word for word as it had been drawn in *French*; and as soon as it was come from under the Press, I presented it to all the R. R. Bishops whom I could meet with in the Parliament-house, and amongst others to my Lord Bp. of *London*, my Diocesan; since which time I never heard of any thing objected against it, save that a particular Friend raised some difficulties, which I endeavoured to answer in the following month of *November*.

This historical account will, I hope, suffice to clear me of rashness and imprudence, whenever the Reverend Dean of *St. Paul's* and I are called before the Convocation; which will not fail to happen, if at any time an anonymous Author, who has made *Animadversions* on the Doctors Book, be Prolocutor of it; since I have us'd an expression, which this *Super-Critic* charges with Blasphemy, viz. That the *Three Divine Persons are three infinite Minds*.

Tho all the favorable presumptions lay on my side, this Author being a man unknown, whose Treatise even the Bookseller is ashamed to own, and who may be suspected to be a *Socinian* in a disguise (b); whereas your Lordship is acknowledged to be one of the learnedst Divines in *England*, and a Man of that Veracity and Integrity, as would not have suffer'd my Essay to have appeared abroad, were it liable to so great an exception as that of Blasphemy or Heresy: However I being a Foreigner, and the Charge extreamly odious, I think fit to justify myself.

Here are the very words of my Essay (*Works of the Learned*, p. 125.) When we say, There are three Persons and one God, we intend to say, there are three infinite Understandings, individually and conjunctly possess'd of the Sovereign Perfection, having each of them a distinct existence, but one and the same nature, substance and common fountain of their Perfection: This I aver to be what the Holy Scripture teaches us of that sacred Mystery,

(b) See especially, p. 357, 362.

Mystery, and withal the constant Doctrin of the Church, in all Ages, which if I do not prove as far as the extent of a Letter in these *Memoirs* will allow, I consent to abide all the scurrilous invectives, which this spiteful Writer so liberally bestows upon his learned Adversary.

But that I may write somewhat more intelligibly than this Author in his 8th Chapter (a), I observe, 1. That whatsoever we can conceive, or form any notion of, whether it be compleat, or incompleat; all that, I say, is either Being, or manner of being; for the modes or manners of being cannot be call'd beings but very improperly, since they have no existence of their own, and serve only to modify the existence of beings.

2. Thence it follows, that in created things every being is a *substance*, since it subsists separated from any other, and is the subject of several properties belonging to it; whereas a mode is only a certain relation, or disposition of a substance considered as so and so modify'd; so that a mode separated from a substance is nothing at all besides an abstract Idea.

3. And therefore a bare mode cannot be the subject of another mode, as Whiteness of Roundness, &c.

4. Here then lies the chief difficulty of that sacred mystery, That the three Persons of the Holy Trinity are together three Beings; and three manners of being; the like instance neither is, nor can be found in any creature, as I have demonstrated in the fore-mention'd Essay, p. 129.

5. That they are three Beings may be thus prov'd. By the 1st Proposition, whatsoever can be conceiv'd, or be in some manner the object of our Idea's, is either being or manner of being, and by the 3^d a bare mode cannot be the subject of another mode: But each of the three Persons are the subject of several modes, properties or attributes of the Divinity, as Omnipotency, Omniscience, Imensity, infinite Goodness, Justice, &c. Nay they are the subject of such modes as are incommunicable even amongst themselves, as the Father of *Aseity* or *Innascibility*, the Son of *being begotten* or *Filiation*, and the Holy Ghost of *Procession*: And therefore the three Divine Persons being distinct from one another, and each of them respectively the subject of the divine Perfections, are not bare modes, but real and distinct Beings: and since they are intelligent and infinite, it plainly follows, that they are three distinct infinite Minds or Spirits.

But says our Observer, (a) why then did not the Fathers call the three Divine Persons *τρία πνεύματα* or *τρεῖς νόες*, *three Spirits*, or
three

three Minds? I answer, because then these words would have been equivocal; *Νῆς Mens*, being appropriated to the Divine Essence, and *πνεῦμα Spiritus* to the Holy Ghost. Now on my turn, I ask him why did they not name them three *Hypostases*, or three *Persons*, before the fourth or fifth Century? I am sure he can give no answers, that are together orthodox and reasonable but these, *viz.* Either that we have lost many of the Writings of the *Ante-nicene* Fathers; or rather since it's plain, that these last terms have been put in use during the *Arian* Controversies, that the Fathers who liv'd before, not being necessitated by the contradiction of the Heretics to give a plainer account of this Mystery than the Holy Scripture, contented themselves with teaching their People, that there are three, Father, Son, and Holy Ghost, who are but one and the same God. So that the true Meaning and Doctrin of the Fathers must not be infer'd from that they did not use such and such words; for words are transient and changeable things, and the same Idea may be join'd to different terms; but it must be sought in their Phrases, and their Way of teaching this important Article, or defending it against the Infidels and Heretics.

Let's then see first, what account the sacred Writings give us of this Mystery. I have already observ'd, that they ascribe to each of the three Persons the several Perfections of the Divinity, and thence infer'd that they are three distinct Beings. This I need not to prove but only refer my Reader to the first System of Theology he shall meet with: for the usual method of those Authors, to assert the Godhead of the Son, and the Holy Ghost, against the *Arians* and *Socinians*, is to shew that the Names, Attributes and Actions of the Deity are ascribed to each of them.

As to the Fathers, it would be an endless work to collect out of their Writings all the passages proving that they conceiv'd the three Divine Persons, as three distinct Beings; which is so true, that S. Hilary of Poitiers, that great Adversary of the *Arians*, calls the three Divine Persons, three Substances, (a) understanding only by that word a Being subsisting by itself, as 'tis in the Creatures, and not the Principle and Center of all the properties and actions of a Subject, as we now do, when we apply it to the Deity.

(b) Lib. 4.
de Trinit. p.
36. Edit.
Basil.

But as these and the like expressions might have induc'd one to believe, that they imagin'd three Gods, they were very careful to assert, that the three Divine Persons were not only three distinct Beings or *Hypostases*, but together three manners of Beings, *τρεῖς οὐ-
νόμαζες* or *Modes of Subsisting* of the Deity, being thus one and the same God, because of the immensity of the Divine Nature, of which they

they were conjunctly and indivisibly possess'd. This is the very same that I have demonstrated in my Essay, viz. that if there be three infinite Minds, as the Church has hitherto taught conformably to the Holy Writ, they cannot have a different nature, but must needs be one numerical Substance, since that infinite Substance must needs be every where, and that if the three Divine Persons be infinite, none of them can be, where the other is not.

S. Epiphanius is very express in his Heresy 62 where he disputes against the Sabellians; *The Trinity*, says he, *is reckon'd to be Father, Son, and Holy Ghost, not as one thing called by three Names, but as really three perfect Names, as three perfect Hypostases, or Persons.*

S. Austin in his Treatise of *The Christian Fight* [*de Agone Christiano*] answers the charge of Polytheism the same way as I do, shewing that what confounds our Idea's, when we speak of this Mystery, is that we apply the notion of *substance*, as 'tis proper to Creatures, to the immense Deity. *Nesciunt enim quid sit una eademq; substantia, &c. They know not what signifies one and the same substance, being deceived by their own Fancies: For, because they see three bodies separate in three places, they think the substance of God is so to be understood.*

(a) Dial. 1. Theodoret (a) renders the same reason of the Unity and Distinction
cont. Anomæos. T. of the Divine Persons. *The Essence or Substance ὁσία of the Father, the Son, and the Holy Ghost is common, being equally and alike, ὁμοίως, immortal, incorruptible, holy and good in all three: and therefore we assert one Essence and three Hypostases.*
v. p. 286.
Edit. Paris.
1684.

But lest it should be replied, that the sense of a separate passage can easily be mistaken or misrepresented, I shall make some short considerations upon matters of fact, which will plainly evince, that the Fathers conceiv'd the three Divine Persons as three distinct Beings or Spirits united by the immensity of the Divine Nature, and being in that sense three modes of subsisting of the Deity.

1. The first shall be the Sabellian Controversies. Praxeas the Founder of this Heresy acknowledged but one Person in God, that is, one being and three modes, making no real distinction between the Father, the Son, and the Holy Ghost, whereupon the Catholic Doctors of his time, especially Tertullian, who is own'd Orthodox in that, reproached him that it follow'd from his Principles, the Father had made himself man, and suffered for mankind; whereas it was the Son, who was incarnate and died for us. In vain Noetus, and Sabellius his Disciple, endeavoured to palliate their opinion, by saying that the Father, the Son, and the Holy Ghost, were distinct from each other as the Soul, the Mind and the Body, which however make up but one Man, that is, one real Being. For all that,

this

this Venom could not creep into the Church, the Orthodoxes presently perceiv'd that it turned Religion into a Comedy, making God, under a certain Relation call'd the Son, satisfy to himself under another relation call'd the Father; whereas the Holy Writ considers them as two Beings or Subsistences really distinct, as when it extols the Love of God on the account of his giving his Son for us, *John 3.16*. And therefore these *Heretics* were branded with the Title of *Patro-passiani*.

2. My next reflection shall be on the Dispute concerning the *Consubstantiality* of the three Divine Persons. The *Anomeans* or true *Arians* were soon exploded, it was so plain they introduc'd *Polytheism* by asserting three Gods of different Nature, and subordinate one to another. But the Dispute lasted longer betwixt the *Semi-arians* and the *Catholicks*. The first thought it sufficed to say that the three Persons were, *ὁμοιόσεις* of the like Nature and Substance, being afraid lest the Notion of *ὁμοουσιότης* *Consubstantiality*, of the same Nature and Substance, might revive *Sabellianism*, for which reason the words *τῶν ὁμοίων* & *ἐν ὁμοίῳ* were rejected. But the Orthodoxes reply'd that the *ὁμοιόσεις* favour'd too much of *Polytheism*, since things may be of the like Nature and have nevertheless a particular and different Substance, as may be seen in two drops of water: So that tho those great Champions of the Church *St. Basil*, *St. Hilary*, of *Poictiers* and *St. Athanasius* acknowledg'd that the *Semi-Arians* differ'd but in words from the *Catholicks*; yet the generality of the latter were loth to communicate with the former, for fear of giving way to *Polytheism* and *Idolatry*.

3. The Dispute betwixt the Orthodoxes themselves concerning the words *Hypostasis* and *Persona* do's no less plainly evince that both the *Greek* and *Latin* Church conceiv'd three distinct Beings united into an infinite Nature. The *Latins* would not admit of the word *Hypostasis*, because the word *Subsistentia* being not yet in use, they had no other to translate *Hypostasis* by, than the term *Substantia*, and it founded harsh and much like to *Polytheism* to say that there were three Substances in the Deity; especially since they were used to render *οὐσία* by *Essentia* and oft'ner by *Substantia*; so that *μία οὐσία, τρεῖς ὑποστάσεις*, *Substantia una quæ est simul tres substantia* was in their Language a contradiction in the very words. On the contrary the *Greeks* would not allow of the term *Persona*, because *πρόσωπον* sounds in their Tongue, *Face*, *Image*, *Appearance*, by which they seem'd to run into *Sabellianism*. But *Athanasius* made them understand in a Council held at *Alexandria*, in 362, that they agreed at the bottom, and there wanted but a determinate sense to be put upon the contested words, which was done accordingly, and the said words re-

ceiv'd by little and little, and used indifferently by the Writers of both Churches.

My fourth consideration shall be on that famous Argument of the Fathers, when to give some Idea of the distinction and unity of the three Divine Persons, they affirm that they are as distinct as *Peter, James, and John*, who tho they be three several individuals, are yet but one Man, forasmuch as Humanity is the same in all three. I grant to the Anonymous that the distinction is not so great, because Creatures are finite Beings, each of which subsists separately and independently from another. But since he is so honest as to own what he cannot deny, *viz.* that the distinction is *as real*, it plainly shews that the three Divine Persons are three distinct Beings, and consequently three distinct Spirits. Those who cannot conceive an immaterial substance or intellectual extension know not what to make of that Argument of the Antients; but as for me, who have as clear and even clearer Idea of an intellectual, than of a corporeal extension, I do not find that Comparison more imperfect than the other Similes taken from created things. I see plainly the Fathers would signify by this that the three divine Persons subsist distinctly from each other, tho they be but one and the same God, since they equally and conjointly enjoy the sovereign Perfection, as Men do possess Reason in common.

Neither the School men, nor our present Divines, whether Protestants or Roman-Catholicks, are accus'd by any Orthodox of having departed from the Ancient Faith as to this fundamental Article; so that this short account suffices to prove that the Church in all Ages has always consider'd the three Divine Persons as three distinct Beings; and consequently as three distinct Spirits. And therefore I have no great occasion to confute the 4 or 5 Arguments, which the Anonymous profers with so much confidence, and sets down in the pompous form of Syllogism. However, as this Gentleman seems somewhat proud of his Learning and Parts, and might boast that they are unanswerable, I must yet beg your Lordship's patience for the reading of a Page or two.

1. *Three distinct infinite Minds or Spirits are, says he, (a) three distinct Gods: But the three Persons of the Blessed Trinity are not three distinct Gods; and therefore the three Persons of the Blessed Trinity are not three distinct infinite Minds or Spirits.* The Equivocation lyes in the word *Mind*, which applied to the Godhead signifies a Substance and a Person. There is but one Principle and Center of all the Perfections and Attributes of the Deity, and in that sense but one infinite Mind or Substance, and consequently but one God: yet this does not

(a) P. 119.
131.

not hinder but that there are three infinite Persons or Intelligences subsisting within, tho distinctly from one another: So that in themselves they are three distinct Beings, and in reference to the Deity, three modes of being or subsisting of the same.

I know not what to make of our Observer; for having read his Book throughout, I freely acknowledge him to be Orthodox: But a Spirit of contradiction carries him sometimes so far, that he talks like a *Sabellian*. Thus, p. 120 he makes this objection to himself, *That we allow of three distinct Persons in the Godhead, of which every one is infinite, without admitting them to be distinct Gods: and therefore we may as well allow of three distinct infinite Minds or Spirits &c.* A very weighty objection; for either he fixes no determinate sense on the word *Person*, or he understands by it an intelligent Being only, or a bare mode of Being, or both together, viz. an intelligent Being subsisting in it self, and withal a mode of Being of the Deity. If the first, then he talks in the Air, he puts an affront upon Mankind, in using a word which no body can understand what he means by't, and exposes this Sacred Mystery to the derision and cavils of the *Hereticks*: If the second, then he is a right down *Tritheit*: If the third a *Sabellian*: If the fourth, he is indeed Orthodox, but then he has no just reason to disprove the use of the word *Mind* or *Spirit* as appl'd to each of the Divine Persons. Now let's hear his Answer.

He says, (b) *That the case is very different, and the reason of the difference is this, because three infinite Minds or Spirits are three absolute simple Beings or Essences, and so stand distinguished from one another by their whole Beings or Natures. But the Divine Persons are three Relatives (or one simple Being or Essence under three distinct Relations) and consequently differ from one another, not wholly, and by all that is in them, but only by some certain mode or respect peculiar to each, and upon that account causing their distinction.* Whether this is Falshood, *Sabellianism*, or Non-sense, I leave others to determine; for my part, he may chuse which he likes best of the three, I am not concerned in it.

His other Arguments will be quickly dispatch'd, I need almost only to relate them.

2. *Three distinct Minds or Spirits are three distinct Substances: But the three Persons of the Blessed Trinity are not three distinct Substances; and therefore they are not three distinct Minds or Spirits.* The Major Proposition is true of Creatures, but false of God. See my Essay in the *Works of the Learned* p. 125 n. 9, 10, 11, & p. 127.

3. His third Argument runs likewise on the equivocation or confus'd notion of the Word *Mind*. If it be truly said, *That one and the same infinite Mind or Spirit is Father, Son, and Holy Ghost* (I mean all

three taken together) and it cannot be truly said, That one and the same infinite Mind or Spirit, is three distinct Minds or Spirits, then it follows, that Father, Son, and H. Ghost, are not three distinct infinite Minds or Spirits. But &c. Mind or Spirit in the Deity signifying the substance of the same, and the three Persons subsisting in it, it may be truly said that one and the same infinite Mind, that is, one and the same infinite Substance, is three distinct infinite Minds, that is, three Persons, or intelligent Beings subsisting really and distinctly from each other. The same answer will serve to this 3. Argument as inverted by him, p. 126.

4. Whatsoever Attribute may be truly predicated of all and each of the Divine Persons in the Athanasian form, so belongs to them all in common, that it can belong to none of them under any term of distinction from the rest: But the Attribute, infinite Mind or Spirit, may be truly predicated of all and each of the Divine Persons, in and according to the Athanasian form: and therefore it can belong to none of them under any term of distinction from the rest. Concedo totum. What then? But I perceive his petty equivocation returns over and over. The Attribute Infinite Mind taken for a Person or intelligent Being, may be truly predicated of the Father, the Son, and the H. Ghost; but not if you mean by Spirit an intelligent Substance; there being but one Substance, Principle or Source of all the perfections of the Deity.

The truth is, this Gentleman makes a sport of the term Spirit, with as much, and I dare almost say with more uncharitableness that the Socinians do of the word Person. How much better would he have done to have imitated the Prudence, Charity and Orthodox Explications of the Fathers of the Council held at Alexandria in 362; (a) who when it was objected that the Phrase of Three Hypostases sav'd of Heresy, as being Synonymous with that of three Substances, replied, That Substance and Hypostasis, or Subsistence, seem'd to have a quite different sense, because Substance signifies the nature and essential reason of a thing; whereas Subsistence declares that property of every Person, by which it exists and subsists. And therefore to avoid Sabellius's Heresy, we ought to own that there are three Substances in the Deity because this Phrase seems to signify as much as three subsistent Persons, to the end we should not give any suspicion of being Abettors of that Sect, which makes the Trinity consist only in names, and not in things and substances. *Quæ Trinitatem in nominibus tantum, ac non in rebus ac subsistentiis constitetur.*

I have used the word Spirit, in order to explain that of Person. 1. Because the Holy Scripture expresses by it the proper subsistence of each of the Divine Persons. So the Father is called the Father of Spirits, Heb. xii. 9. The Son an Eternal Spirit, Heb. ix. 14. The Spirit of Holiness, Rom. i. 4. And as to the Holy Ghost Spirit is his proper Name.

(a) See
Ruffin. Ecc.
Hist. l. i.
c. 29.

June, 1693.

183

Name. 2. I was forc'd to interpret the term of *Person* by those of *Understanding, Mind and Spirit*, by the confus'd notions and unwary expressions of some Divines, which have given occasion to the *Soci-nians* to reproach us, that we use it only as a cover of Ignorance, without knowing what we say. And thus in employing those terms, I have acted with the same Prudence, as the Fathers did in not using them, *viz.* the necessity of explaining myself, and preventing equivocations. But words can never be so well meant, nor fit for the purpose, as to avoid being wrested and abused by a malicious Author.

LETTER XXIII.

To the Honoured Dr. Wallwood, Overseer of the Physicians of Their Majesties Fleet.

ARGUMENT.

Of a Gentleman altogether constipated during three Tears. Whether this Relation be credible? Whether it can be explained? Of a Woman that could forbear drinking any Liquor, during two or three Months. Fowls make no Water at all, and why? Hens and Geese digest massive Cryстал. The five Fermentations of the Aliments. What makes the Air healthful? What Soil is most proper for Vines? Suppositions to explain the Symptoms of that long Constipation. Why Liquors how spiritous soever leave a Sediment behind them, when distill'd in an Alembick? The proper sense of the word Nature. The Author's Excuse, and his Complaint of the Ingenious not sending in any thing.

Honoured Sir,

I Account it no small misfortune that my present occasions force me to lead such a private Life, that I have neither liberty nor leisure

sure to wait upon my Acquaintances, and especially upon you, to whose obliging manners and ingenious conversation I am so much indebted. However to do what I can in the circumstances I find myself, I shall presume to entertain you with one of the most surprising Accidents that I ever read in Physic, and withal to ask your opinion of it, in order to know whether the natural causes of such strange symptoms may be found out.

The Relation of it was printed at *Paris*, by *R. La Caille*, in *St. James's-street*, in a single Memoir, directed to the Physicians by way of consultation, under the Title of *Historia admiranda cujusdam suppressionis alvi, &c.* 4^{to} But as such flying Papers are easily lost, and more difficultly recover'd, especially in this time of War, I am not so happy as to have seen the Original, but only an Abstract, which the learned *Mr. Confin* has inserted in the Journal of *Paris*, N^o. 21, May 25, 1693.

A Gentleman born and living at *Beaune* in the Dutchy of *Burgundy*, was seized at Fourteen years of age with such violent pains in his Belly, that he was almost ready to dye. These gripes were followed with a Fever [continued, I suppose] which ended at the 14th day, but left him so strangely constipated, that notwithstanding all the remedies he made use of, he was three years long without having so much as one stool, tho he ate and drank well, all that time.

But what is most wonderful of all is, that the remedies were consumed in his body as well as the aliments: for he never vomited, nor had he any other natural evacuation that could supply the want of Stools: Since the Water he made was proportion'd to the quantity of the Diet-drink he perused; neither did he ever sweat, unless they gave him some strong Purgatives. However this long and unheard of Constipation caus'd in him neither pain, oppression, weariness, loathing of meat, nor want of sleep.

At the end of the three years, as he came on Horseback from *Ste. Claire de Seure*, a small Town upon the River *Saone*, four Leagues East of *Beaune*, he was seiz'd again with the Gripes and a continu'd Fever that lasted nine or ten days; during which he was let blood and purg'd, and the binding vanished with the Ague: for immediately after his Body retook its natural constitution, and was as open as it had ever been; so that ever since, that is, during the space of ten years, he has enjoy'd a perfect health.

The Physician, who took care of this Gentleman and is apparently the Author of the foremention'd *Memoir*, ascribes his Patient's violent pain to bilious Juices mix'd with Phlegms and raw humors caus'd by the excess of Fruits and Pulse, that this young man had eaten

eaten. He farther believes that the Winds included in the Salt and acrimonious Excrements were the cause of the Gripes, whereof the sick complain'd at the beginning and end of his Disease. Put by this Doctors leave, if he say nothing more to the purpose, than what the *French* Journalist here relates, he has quite overskip'd the difficulty, that does not consist in feigning some probable cause of the Gripes, which every Student in Physick can do: but in giving some appearance of truth to that strange Symptom of so long a binding accompanied with no other inconvenience. For without that, his relation will still remain unaccountable, and very near incredible.

For you know, Sir, that before the meat and drink we feed upon can be converted into our substance, they must undergo a great many filtrations, and pass through a vast number of channels, conduits and fibres, to be distributed through all the parts of the body. Some of these conduits and fibres are of a prodigious smallness, so that the Liquor into which the Aliments are reduc'd must needs grow very subtle and spirituous, and even be incessantly refin'd by the constant action of the Air upon us, and the perpetual waste and motion of our bodies, which is the cause that many particles grow so very thin and weak, that they are no longer serviceable for life, and therefore are exhal'd or expell'd by respiration and insensible transpiration.

The ordinary ways of digestion are easy to be understood, since Chymistry furnishes us with many instances, that are akin to them. But herein lies the difficulty, that all the efforts of that wonderful art could never entirely resolve one single body into a spirituous substance; so that all bodies whatsoever, tho never so subtle and refin'd, as Spirit of Wine may be, do still leave a sediment or *Caput mortuum* behind them. And accordingly experience teaches us that, tho the greatest part of the aliments we take in be subtiliz'd by degrees, yet at every filtration there remains some gross matter that seems to be indissoluble, of which Nature discharges itself several ways.

And therefore this relation being so opposite to all natural and artificial experiments ought, methinks, to have been better confirm'd; the Name of the Physician, and the young Gentleman set down, and even those of some Persons of honour, who had waited upon him during his Disease. On the other side, I am loath to mistrust so far a Man of the repute and learning of Mr. *Cousin*, as to imagine that he has inserted this History into his Journal without good warrant, and meerly on purpose to fill it up with incredible Relations.

And therefore supposing the main of the matter of fact to be true, I am minded to try whether it can be explain'd; not indeed accurately,

rately, but at least so far as to come somewhat near to a probable account of it; submitting my Conjectures in these to your Judgment, with as much and perhaps more sincerity, than some Divines do theirs to the Censure of the Church.

1. There are indeed several ways by which Nature voids the gross Excrements, as I have already observed, but this evacuation is very different according to the various constitution of Men. There are some who never sweat or but very seldom, and in general the stronger men are the more they eat, and the less however is the quantity of the gross excrements they discharge themselves of; and consequently the greater is the insensible transpiration.

2. Drink seems as necessary to liquefy the aliments and help on the Digestion, as Stools to void the gross excrements: Yet I am informed by an ingenious and very sincere Acquaintance, (a) that he had an Aunt, who was sometimes two or three months without drinking at all, nor having any sense of what we call thirst, which undoubtedly proceeded from an abundance of soft and wholsom humours, that sufficed to dissolve the aliments she took.

(a) Mr. Papin the Machinist.

3. I know not of any Bird that makes water, tho none can forbear drinking 24 hours without a sensible Disease: The reason of which seems to be, that the feathers, they are cover'd with, require such a vast deal of humors for their sustenance, that there remains no superfluous moisture to be ejected by Urines.

(b) *Esperienze intorno alla digestione d'alcuni Animali.*

4. Some Fowls, as Hens and Geese, have such a powerful fermentation in their Stomach as to digest massive Cristal in few hours, and even to work upon Lead and Tin in the space of a day and night, as has been tried by those curious searchers into Nature's Secrets the Academicks of Florence. (b)

5. You know, Sir, that our Food must undergo five principal Fermentations, before it can be proper for the nourishment of our Bodies. 1. After it hath been chew'd by the Teeth and diluted by the Spittle, it falls through the Gullet into the Stomach, where the weight of the meat dilates by degrees the Cavity of that Membrane, and strains out of its Glandules a Liquor Acid and *Alkali* or acrimonious much like to the spittle, which dissolves the chew'd meat into Chyle. 2. The Chyle passes thence into the Guts, to be fermented again by the mixture of two Liquors, the one Acid coming from the *Pancreas*, and the other *Alkali*, proceeding from the Liver. The chief use of these two Liquors is to precipitate the gross and terrestrial parts of the meat, and make it look whiter and purer. 3. The purif'd Chyle goes then to the milk-veins and the *Mesentery*, where 'tis again diluted by a Lymph flowing thither through several Vessels.

Vessels. 4. One of the chief fermentations of the Chyle is made in the Lungs by the inspiration of the nitrous air: 5. And the last in the Heart by its mixing with the blood.

6. That the air contributes much to the digestion is undoubted; and I am inclined to believe that it does it by the admixtion of nitrous steams and light sulphureous particles, that cause several insensible explosions, create fresh gales, and thus purify the Atmosphere. For the forementioned Academicians observ'd that amongst the Hens they dissected, those had digested the quickest, that had swallow'd a greater number of flints, which, by the sparks of fire they emit when struck, are known to contain abundance of niter and light Sulphur.

7. *Beaune* lyes under 46 degrees 46 minutes of Latitude, and 25 degrees 58 minutes of Longitude, that is, almost in the middle of the Temperate Zone. But what renders it most healthful is its situation on a small and clear River, expos'd to the rising Sun, and defended from the West wind by mountains and hillocks, which are cover'd with *grez*, that is, a kind of little stones or flints, the fittest soyl in the world for Vines. These flints emit a vast quantity of nitrous and light sulphureous steams, that make the air extraordinary wholesome, and produce the delicatest Wine in *France*.

8. As far as we can judge of this young Gentleman, by the account the Journalist gives of him, he seems to have been of a very strong constitution, not to have impair'd his health by debaucheries, nor diverted the course of the vital Spirits by study or cares; but wholly to have spent his time in innocent and healthful recreations, as playing, hunting, riding on horseback, &c.

Now to come to a conclusion, I suppose, with his *French* Physician; 1. That the original of his disease came from having surfeited himself with fruits, as young men of that age are apt to do; 2. That the *Féver*, which follow'd thereupon, not only consum'd those crudities, but even the moisture of his body, so far as to shrink his bowels, especially the *Rectum* and the *Sphincter*, through which the gross excrements are discharg'd; 3. That by this shrinking, the Chyle being forc'd to stagnate or stay longer in the Stomach or Guts, was more subtiliz'd than ordinarily it is, so that most or all was able to pass through the Milky Veins and *Mesentery*, without leaving any considerable sediment behind it; 4. That being there diluted again by the Lymph, and then brought into the Lungs, the respiration of the inspir'd air carry'd away many gross particles, that otherwise would have been the *caput mortuum* of the Chyle; 5. That the remains of the gross particles were carry'd down with the phlegmatick part, through the emulgent Artery into the Loyns,

where they were filtrated and discharg'd by Urine. 6. That tho the sediments were at first inconsiderable, yet in so long a time as three years, they increas'd to that bulk, that Nature to discharge it self was put as in a second labor, which caus'd the second continu'd Fever, after which the young Gentleman was well again.

The observation of Chymists, that the most subtle Liquors, as Spirit of Wine, leave a sediment behind them, does not destroy my suppositions. 1. Because I do not say that the Chyle in this young man left no sediment at all; but only a very inconsiderable one, or such a one as might be carry'd down with the phlegmatick part, and filtrated by the Loyns. 2. Because there is a great difference betwixt the distillations that are made in an Alembick and a long-neck'd bottle, through whose pores, even the most spirituous part of the Liquor cannot pass; and the fermentations of the aliments in our Body that is every where pervious. Add to this, that the natural heat, the Spitte, the liquors of the Stomach, *Pancreas* and Liver, the niter of the air, &c. are more powerful ferments, than any artificial fires or *Menstruums* whatsoever. And therefore we see that tho rectify'd Spirit of Wine leave a *caput mortuum* when distill'd again, yet if you throw it into the air, not a drop will fall to the ground, it will so mix and incorporate with it: Likewise Spirit of Salt *armoniac* will altogether evaporate, when heated in an open Bottle: And why then might not the gross particles of the Chyle be thus carry'd away by the inspir'd air, when Nature is put to such streights as to have no other way to discharge itself of them?

I have us'd the word *Nature* in a sense, which, I foresee, will offend some modern Philosophers. The truth is, I am not so perspicacious as to be able to explain all the actions and motions of living Creatures by the meer Laws of Mechanism; so that I am forc'd to suppose that God has granted them a power to restore their bodily Machin with the help of the air, aliments, remedies, &c. as long as their Organs are fit for life; which power is the cause of those wonderful explosions and motions, by which some diseases are cur'd. If those Gentlemen can explain all the symptoms of health, sickness and recovery, without this supposition, they will, I am sure, mightily oblige the learned World in the performance of it.

But after all my endeavours perhaps I deserve to be pounded, for entertaining you with things so remote from my profession and so far above my ability. However, Honoured Sir, I hope, you will be so kind as to make yourself my Apology, considering the design of these Memoirs, which ought to be more diversified than my Li-

June, 1693,

189

brary, or small stock of Knowledge can ever do. I had undertaken them First, upon promise of being constantly supplied with the Physical and Mathematical Memoirs of *Paris*. Secondly, On hopes that the ingenious of this Kingdom would send me some of their Observations and Discoveries; which I had reason to expect, having given to these *Memoirs* such a comprehensive Title, and begun them at a time, when the *Philosophical Transactions* were discontinued: However both promises and hopes have fail'd me. This taken into serious consideration, will, I hope, move an ingenuous Reader to give some grains of allowance to a work, which ought to be compos'd by a numerous Society, whereas it is written by one single man, and that too in a very short time, in very bad circumstances, and amongst many other troublesome concerns; tho neither Honor, Conscience, nor my Present Occasions will suffer me to leave it off. A

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LETTER XXIV.

To the Honoured Robert King, Esquire,
Counsellor at Law.

A R G U M E N T.

A Description of a little beautiful Fish. Thirty four Arteries and Veins in the Fin of its Tail. The form of the first Particles of red Blood. The Circulation view'd in Eels. What's the Cause or principal Effect of most Diseases? Prodigious Swelling of the Blood-Vessels. Whether it flows, wrapt up in a Membrane in the smallest Conduits? New Channels digg'd through a congeal'd Mass of Blood. How Nature supplies the defects which the obstructed parts cause in the Circulation? This prov'd by instances of this Circulation view'd in Perches, Pikes and Trouts. Why the Laws of motion in living Bodies are so unknown?

Honoured Sir,

I Perceiv'd lately in you, when you were pleas'd to shew me your Microscopes, so much skill and knowledge in those matters, that I know not of any Ingenious better intitled than you are, to the farther observations of Mr. *Leuntenhoek*, concerning the circulation of the Blood, which I have promis'd to the World.

This Gentleman has view'd the Circulation, not only in the Worms of Frogs, as I related in my XIX Letter, but also in several sorts of Fishes.

There is one especially, which to the naked Eye is hardly so long as the third part of an inch, and as big as a line; and no other part of its body can be distinguish'd besides its head and tail: But to the Microscope it appears a foot, 4 inches and a half long, 2 inches and 2 thirds.

2 thirds big in the middle part of its body; an inch and a half at its mouth, and half an inch at the narrowest part of its tail: Its Head resembles that of a Sea-dog, and its Eye that of a Haddock. The fin of its tail bears some likeness with a Fan, being a pointed oval, 4 inches long, and 2 inches 2 thirds broad. Its body is curiously speckled with various figures, more than I can name, or Mathematicians could ever invent. Besides the fin of its tail, there are two on the lower part of its body, each of the breadth of half an inch, and as long as that of the tail: and withal ten other little fins orderly stretch'd to its head. In a word, this little creature gives such a pleasant prospect, that I would have caus'd it to be represented here, had not the drawing of it requir'd too much time, and been of too great expence for my Booksellers. However, this description suffices to give an Idea of the goodness of Mr. *Leeuwenhoek's* Magnifying glasses, since you see by this that they increas'd this Fish 49 times in length, and 32 in breadth; shewing the object all at once with all the possible distinction and plainness.

This Fish lives in the Water-ditches of the Cities of *Holland*, amongst the Frogs, whence our Author took some of them, and discover'd the circulation of the Blood, along the bones of the tail, on which the fin is fastned, in continued vessels, carrying the blood to the end of the tail, and then again to the heart. He also perceiv'd that these conduits were much like to Rivers, when represented in a Map, consisting of great and small vessels, the small ones discharging themselves into the great.

But what is worth your special notice, is, that in the fin of the tail, which is not longer than 3 fourths of a line, there happens 34 circulations of the Blood, that is, there are 34 Arteries, and as many Veins; there being 32 little bones, betwixt whom the blood runs from the tail to the extremities of the fin, and thence returns to the tail, and consequently to the heart: Whence the Author infers, that throughout our body, within the breadth of a nail, there are made a thousand circulations.

He has likewise discover'd the said circulation in the fins of young Trouts and Breems, it being impossible to view it in the other parts of a Fish, since they are cover'd all over with scales.

He confirms here an observation which he had formerly made, viz. that the particles of blood, which give it a red colour, are not perfectly round, but flat ovals, being longer than broader. He also sometimes perceiv'd that the blood was stopp'd in the smallest Arteries, and went somewhat backwards, but soon after it return'd again and pers'd its ordinary course, tho not in the same channel, but in another hard by.

I come.

I come now to his observations concerning the circulation of the blood in Eels, which if you can be at the pains to compare with yours, and then be pleas'd to communicate to me the agreement or the difference that are betwixt them, you will surely oblige the inquisitive world.

He put young Eels in a broad and high glass, and let them swim freely in the water wherewith he filled it. Then, when they came to rest, he viewed the Fins next to their head and tail, and perceived in the Fins next to the head, such a prodigious number of Vessels, that they seem'd to be almost nothing else. He remarks that in the fin of the tail, tho the circulation be made for the most part in such small conduits as admit but one single particle of *Red Blood*; yet towards the extremities of their fin, the conduits grow so large, by the union of smaller conduits, as to let pass two or three of those particles together.

I never doubted but that several diseases proceeded from the coagulation of the blood in some parts of our Body, notwithstanding which a man can yet live very long. This conjecture may be confirm'd by an experience of the Author, who having got Eels caught in the *Mense*, which had lain but four hours in a tub without water, he found their blood congeal'd, and without any motion towards the extremities of the fin of the tail, tho at the breadth of two or three hairs nearer to the tail, the blood did freely circulate, in a vast number of Vessels. He us'd his utmost endeavors to dissolve this coagulated blood, by causing the water wherein the Eels swum to be often refresh'd; but instead of that, he perceived that it turn'd into curds more and more: So insignificant is the power of our outward agents to cure inward diseases, without the help of Nature.

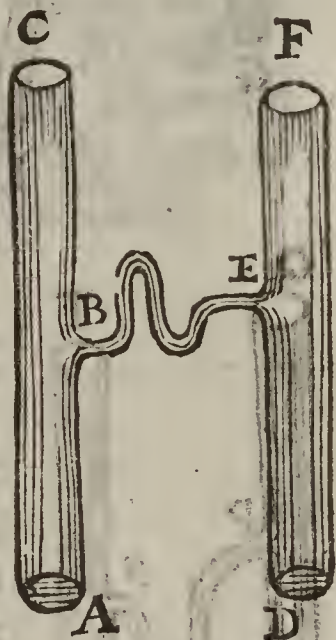
Out of the many windings which Mr. *Leewenhoeck* has observed in the circulating blood of Eels, I have caus'd the most remarkable to be carv'd. A B C D E represents a Vessel lying betwixt two little Bones, that keep and strengthen the fin of the tail. A B C may be call'd an artery, and C D E a vein; because the blood runs from A the side of the tail, through B, towards C the extremity of the fin; and then returns through D and E, into the body of the Fish. C I is a small bone, that joyns this vessel to another hard by F G H I K, wherein F G H may be nam'd an artery, and H I K a vein, tho properly they be but a continued Vessel. These two conduits are so near one another, that the space betwixt A and F may be fill'd up with the breadth of 4 hairs.



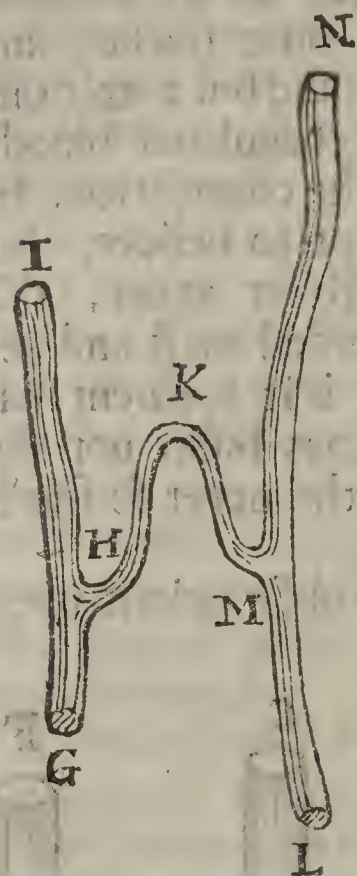
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The Vessels in which the blood turns into curds do extraordinarily swell; the Author says, that they grow 25 times thicker, and that he once perceived a small channel (such as would but admit one single particle of blood) running through the coagulated blood, which channel had apparently been digg'd after the congelation, by the strong propulsions of the heart. He seems apt to believe, that had the Eel been let loose, or thrown into the River again, this little channel would have dissolved the whole curded mass and restored the blood to its former motion. Neither is it apparent that the coagulated blood could swell to that prodigious bulk, nor dig now and then a new Channel, did each conduit, tho never so small, require a particular membrane.

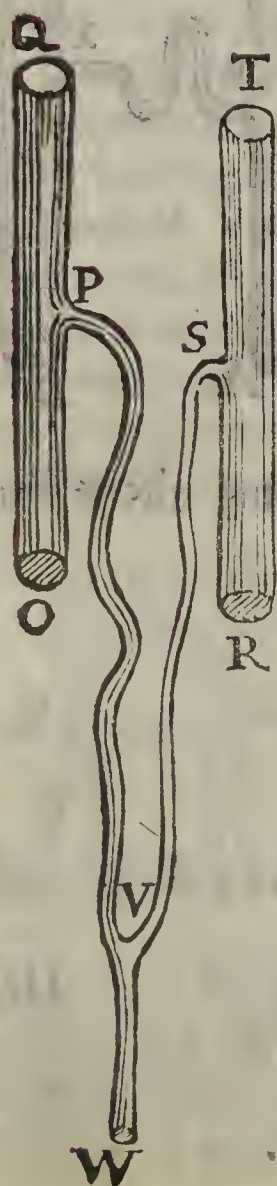
These conjectures may be confirmed by his observations upon Perches; for having viewed them some time after they had been fished, and the extremities of the fin of their tail being spoil'd or worn off, the circulation could not be viewed there, but only hard by the tail, and in so large Vessels as let pass 5, 6 or 7 globules of blood together. Here he observed that in a great artery (he calls it great in comparison of other smaller, for it was not bigger than a hair) the blood was push'd, but softens forward from A to B, and did but just move from B to C, being farther wholly coagulated. But from the place B, in the artery A C, issued a small and winding rivulet, marked here B E, which carried the most part of the arterial blood into the vein D F, so that it ran freely from E to D; the rest of the blood betwixt E F being altogether congealed.



He



He perceived the same in the fin, near the tail of a Pike that had been fish'd some days before. For in the artery GI, the blood ran with its usual swiftness from G to H, then meeting with some obstruction grew flacker, but from H issued a branch HKM, which carried the blood into the vein LMN, discharging it at the point M, that it might be brought again to the heart.



He has been more successful in the viewing of Trouts, having met with some that were lively and entire. He plac'd them in water so, that the fin of their tail lay half an inch out of the water, and then discover'd betwixt every one of its little bones, the blood circulating through continued arteries and veins, as distinctly as in the little Fish above mentioned. But in another Trout, the fin of which having been somewhat hurt, the blood was there coagulated; and the circulation only sensible hard by the tail; he perceived an artery OPQ, in which the blood lay still, or congeal'd from P to Q towards the end of the tail, tho' it had a motion from O on the side of the body to P, where it discharged itself into the vein PV. Over against this artery, within the space of three hairs breadth, lay another artery RST, in which the blood was likewise coagulated from S to T, and farther up to the end of the tail and fin; whilst the blood that came up from R to S ran out at S into the Vein SV, which joyning the vein PV, at the point V, made together a greater vein VW.

I have

June, 1693.

195

I have put these three observations together, to shew how Nature preserves the circulation of the blood about the heart as long as possible, deserting the extream parts, when she is not strong enough to remove their obstructions, and to give them life and vigour; and even digging new channels, when she cannot lead the blood thro' the old ones. Just as the courageous Commander of a besieg'd Town, who yields not a foot of ground to the enemy but at the last extremity, repairs the tumbling Bastions, and makes even new works when the old are taken. Perhaps a *Cartesian* will laugh at the comparison. Really, Sir, he may, as to that, do what he pleases: for tho I would not have it to be urg'd too far, not designing to revive the plastick principle of *Pythagoras*, nor the substantial forms of *Aristotle*; yet the laws of motion in the bodies of living creatures are so remote from the vulgar laws of Mechanicks, or so unknown to me; that I can find no other plausible excuse for my ignorance than to say, they are the Machines of God Almighty, whose delicate and imperceptible Springs cannot be easily discover'd by weak and mortal Eyes: Especially, since we cannot take them to pieces, and then set and wind them up again, as we do a Clock.

FINIS.

ADVERTISEMENT.

AT last I have received something, a very curious paper, sent to me, I hope, in quality of Author of the *Memoirs for the Ingenious*; for it was left for me at the *Latin Coffee-house*, and I cannot imagin how I should be known otherwise to the Gentleman, that has presented me with it. But I give it to the best Conjuror in *England* to divine what it is? — It's a propheticall brass-cut, under the Title of the *New Jerusalem*; which by the by, I heartily wish that it may prove true, if it be as rightly meant as I suppose. In the mean while, not knowing what to do with it, nor how to shew my gratitude towards the Presenter, I have clapt it on the door of my Closet; an honor, which no Almanack ever had. I could wish the Ingenious would present the world by my means with something more suitable to the design of these *Memoirs*, and I am inform'd they would, were I in a fit state to reward them; I am sorry I am not in such a condition, for their sake and for mine. Those who shall be so generous as to send me any Paper, are desir'd to direct them to my Lodgings, at Mr. Fage's, a Turner, in *Playhouse-yard*, near the *Thistle and Crown*, in *Black-fryers*: And I promise them to let 'em appear abroad, in the best form that possibly I can; which is all that I can do at present.

Those who will take a particular notice of the dispute betwixt the anonymous Observer and me (Letter 22.) are intréated to read before attentively, my *Essay towards the Explication of the Mystery of the Blessed Trinity*, contained in the *Works of the Learned*, October, 1691. There are still some few Sets in the hands of Mr. Rhodes Bookseller, at the *Star in Fleetstreet*, near *Bride-lane*: but none of that Month asunder.

The CONTENTS.

Letter XXI. <i>Objections against the Hypothesis propos'd in the XI Letter, concerning the Formation and Drowning of the Earth, resolved.</i>	163
Letter XXII. <i>The Phrase of Three distinct infinite Minds, justified.</i>	172
Letter XXIII. <i>History and Explication of a Constipation of three Years standing.</i>	183
Letter XXIV. <i>The Circulation of the Blood viewed in several sorts of Fishes.</i>	190

F I N I S.

MEMOIRS FOR THE INGENIOUS.

CONTAINING
Several Curious Observations in *Philosophy,*
Mathematicks, Physick, History, Philology, and
other Arts and Sciences.

IN
Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

JULY, 1693.

To be continued Monthly.

VOL. I.

*Sed nihil dulcius est bene quam munita tenere
Edita doctrinæ sapientum templa serena :
Despicere unde queas alios, passimq; videre
Errare atque viam palantes querere vitæ,
Certare ingenio.*

Lucret. l. 2.

LONDON, Printed for W. Rhodes at the Star, the Corner of
Bride-lane in Fleet-street. And for J. Harris at the Harrow in
the Poultry. 1693.

Where are to be had the Memoirs for *January, February, March,*
April, May and *June.*

MEMOIRS

INGENIOLUS

CONTAINING
Several Curious Observations on the
Invention of the Printing Press, and
Other Arts and Sciences

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"Ingeniolus"
LONDON: Printed by J. Baskin, at the
"Ingeniolus"
1784

Memoirs for the Ingenious.

JULY, 1693.

LETTER XXV.

To the Right Reverend Father in God
GILBERT Lord Bishop of Sarum.

ARGUMENT.

Occasion of this Letter. The least Punishment that can be inflicted on the Corrupters of Religion and Morality, is to shut them up. Boldness of the Publishers of a late Atheistical Book, intituled the Oracles of Reason An Answer to that Part that concerns Deism. The Truth of the Holy Writ justified; some Objections answered. What the Deists ought to prove, to talk rationally. Their Faith: It cannot be demonstrated by the Light of Reason. Comparison between the Deists and Aristotle. The Necessity of the Revelation. The Truth and Certainty of it demonstrated. A new Reason for the Long Lives of the first Patriarchs. The Origin, first Author and Progress of Idolatry. The design of the Founders of Babel. How Religion came to be corrupted, and how long it remained untainted.

My Lord,

THO the Quality of Author, which the hard condition of an Exile has impos'd upon me, almost from my tender years, hath

hath made me known to your Lordship even before this happy Revolution: Yet, I thought not fit to address myself to your Lordship in such a public way as this, nor to be importunate with you for the performance of those kind promises, which you were pleased to make me in *Holland*, and again to repeat since my coming hither. I am now pretty much us'd to hardships, and so far content with my present condition, that I am not ambitious of much more: So that were it only for my own sake, I might have longer superseded directing a Letter to your Lordship in these *Memoirs*. But when I see Religion itself concerned, lewd and prophane Men attempting to shake its very foundation, not only by private Underminings, but even in so public and heinous a manner, as that they make bold to print their impious Collections, and prefix their Names to them: On such an occasion, My Lord, I cannot forbear to awaken that Zeal, which you did not many years ago so successfully employ, in stopping the progress of Superstition and Idolatry, to the great Happiness of this Church and Kingdom. It were to be wish'd that your Lordship, and those other great men, who have obtained so many and so glorious Victories against Popery, should vouchsafe to stop the mouth of our clamorous *Socinians* and *Deists*; tho I confess they are not so terrible as to deserve such worthy Adversaries; and a mean Writer as I am may be pretty even with them, their greatest strength consisting in an inexhaustible stock of confidence. But, my Lord, if you think us sufficient to act the part of Physicians in this occasion, and to hinder the Venom of Irreligion from spreading farther, your Lordships ought, methinks, to use their credit, that spiritual Chirurgions may not be wanting.

— *Immedicabile vulnus*

Ense recidendum est, ne pars sincera trahatur.

I never was for hanging or burning Heretics, no not *Socinians* and *Deists* themselves, because I am perswaded there is for the most part more prejudice, folly and obstinacy, than malice in their case. But if it be the right of every Society to rid itself from troublesome Members; if it be lawful and even commendable to shut up Fools and Lunatics in proper houses, lest they should affront or mishandle men of sense in the streets, or in the high way; I do not see why such as go bare-fac'd about to destroy our spiritual life, should not be confin'd as well as those who endanger our corporeal security. In vain they answer 'tis an error of their understanding, which they cannot help; for the Advocates of Mad-men may make the same plea,

July, 1693.

199

plea, and nevertheless not be heard. If all men were of a strong constitution, the danger of letting Lunatics loose would not be very great, because of their fewness in number; but there are old and weak persons, women and children, that should then lye exposed to the injuries of that furious people. Thus if all the Christians were learned, pious and good Philosophers, *Socinianism* and *Deism* would be only the matter of their scorn or pity. But there are many Children amongst us, who have only as a beginning of spiritual life, who have indeed a good and honest heart, but not an understanding so piercing, nor a Judgment so sound and rightly inform'd, as to become easily Masters of all the objections, which the impious can make against Religion, or any of its Mysteries.

The *Hebrews* use to express *Religion* in general by the *Fear of the Lord*, which is one of its fundamental Articles; and your Lordship knows what commendations the wisest of Kings bestows upon it: *It is the beginning of knowledge, the instruction of wisdom, a strong confidence, a fountain of life: one may get by it riches, honour and life.* But if we ask *Solomon* what is the chief duty of Religion, or the fear of the Lord, he will tell us that it is *to hate evil, to depart from evil, to depart from the snares of death; for then a mans ways please the Lord, and he makes even his enemies to be at peace with him.* Prov. xiv. 27. xvi. 6, 7.

This and less would suffice, did I write only for your Lordship, but since this Letter is design'd for the publick, I shall add a weighty consideration, which I have first learned from your self. It has been the policy of the enemies of our Religion, and of the unhappy constitution of this Realm, to sow dissention amongst us; in order to which they have transformed themselves into all sorts of people, Commonwealth-men, Dissenters, Levellers, Quakers, Non-Jurors, Socinians, Deists, Atheists; 'tis all one to them if they can do us mischief. However 'tis strange that this cheat having been so often discover'd and exploded by many grave Divines, and amongst others by your Lordship, they should bring it again upon the Stage; but they cannot leave it off, it has succeeded with them so well, it has embroyl'd us in a Civil War, and so they hope it will do once more. And therefore one may observe them endeavouring to undermine the reputation of the greatest men of our Church, whose zeal and writings have been the greatest obstacle to Popery; as of his Grace my Lord Arch-bishop of Canterbury, of my Lord Bishop of Litchfield and Coventry, of your Lordship, of Dr. Sherlock, &c.

Whosoever shall consider this attentively, will not be mov'd by the faint plea for Liberty, which he may read in the Preface to the pretended *Oracles of Reason*, an impious Collection of Sceptical and Atheistical pieces to ridicule the Holy Scripture, the Mysteries and Fundamental Articles of the Christian Religion, printed by way of Letters with the names of the Authors, two Gentlemen very well known in this City. Certainly if the Publishers are not paid for disturbing the peace of the Church and Government, they rather deserve to wear a Fool's Cap than to manage the Pen of an Author: For can they be called wise, who expose themselves to an infamous death, or at least to the hatred of mankind, for such an inconsiderable reward as Booksellers can afford them? Conscience they cannot pretend, for it does not appear through the reading of their Book that they have any Religion at all. They have inserted in it two Papers for *Deism*, only as I take it, to deride reveal'd Religion the more *sarcastically*; for they mock even at *Deism* itself, so that they must needs be either Fools, Atheists or Traitors.

Those that have not read this piece of news (for so I may well call it in reference to the boldness of the attempt) will undoubtedly say that I deal disingenuously with those Gentlemen: But I sincerely protest that I have not, for ought I know, any reason of my own to complain of them; neither would I do them any hurt if it lay in my power, unless they should give that name to my taking security of their behaviour for the future. On the other side the Publishers are not men of that consideration in the world that it may be imagin'd I design to raise my self upon their ruin. So that my only aim in this is to awaken the high powers, for the suppressing of this mischievous Book, which I fear is already too much spread abroad, or at least to prevent the coming out of others of the like nature.

Perhaps some will say that this is not fair dealing, and that I have recourse to the Magistrate for want of Arguments. I am content your Lordship and every impartial Reader should judge of it: by some few touches I shall have on that part of this Book which concerns *Deism*, and which is, in my judgment, the best written, as likewise the most dangerous.

Page. 196. The first and only argument of the Author runs thus: That rule, which is necessary to our future happiness, ought to be generally made known to all men. But no Rule of Reveal'd Religion was, or ever could be made known to all men. And therefore no Reveal'd Religion is necessary to our future happiness. The Major he proves thus. Our future happiness depends upon our obeying, or endeavouring to fulfill the known will of God. But that Rule which is not generally known cannot be generally obey'd, and therefore

fore that Rule which is not generally known, cannot be the Rule of our future happiness.

In answer to this, I deny the Minor of the first Syllogism, which is so far from being *matter of fact and uncontrovertible*, as the Author pretends, that it is a plain falshood; at least if we believe the most ancient History extant in the world, the first Book of *Moses*. For by that it appears, that as soon as God had created man, he reveal'd himself to him either immediately, or by the ministry of Angels, that he continu'd so to do to the Antediluvian Fathers, then to *Noah* and the following Patriarchs after the flood.

If it be objected that the Deists deny the authority of the Holy Writ; I shall ask upon what ground they do it, since a bare denial will not suffice. A Chapter, say they, has been added to the *Pentateuch*, containing an account of *Moses's* death and burying; as tho there was any thing more common than to add an Author's life or death at the end of his works. Some few proper names have been changed, the new ones being substituted to the old, as *Dan* for *Laish*, *Gen. xiv. 14.* compared with *Judges xviii. 29.* or a particle inserted here and there, as when 'tis said that the *Canaanite* was then in the Land. *Gen. xii. 6.* As to this last phrase, its genuine and proper sense is, that the posterity of *Canaan* was already settled in the Country, when *Abram* went out of *Ur* in *Caldee*. And as to the change of proper names, were they all new, or invented after *Moses's* Death, it would be, I confess, a strong presumption that this History, in the state we have it now, has not been compil'd by that holy Legislator: but there are so many old appellations which fell into disuse some ages after, (as will appear to those who shall compare *Joh. xv.* with *Nehem. xi. 25-36.*) that this variation has most probably other causes. For instance, it may be ascribed to the foresight of *Moses*, who, having drawn a scheme of the division of the Holy Land, called the several places of it by the new names he had ordered the *Israelites* to impose upon them, after the Conquest. And tho it were imputed to the Transcribers, who, finding another name written in the Margin, took it for a various reading, and prefer'd a word known to them to one they could not understand: tho it were so, I say, it would signify no more, but that the sacred Writings have undergone some small alterations, the common and unavoidable fate of old Books. And can this amount to the constant tradition and testimony of the whole *Jewish Nation*, in all ages, and the confession of their own Enemies, into whose brains it never came to deny that *Moses* is the Author of the Books that bear his name, till after our Saviour's birth?

Certainly,

Certainly, an impartial and sensible Man cannot be guilty of such ridiculous thoughts, and should the Deists themselves judg so amiss in the ordinary occasions of Life, they would quickly appear in their true and proper colours. So that upon the whole, their Cavils are but a sign of their uneasiness, and of their eagerness to find fault with the Holy Writ, as with a Book that confines their passions to too narrow limits. They will suffer no other rule but their own reason, which self-love can easier manage and seduce, than their superficial Learning wrest the Scripture. However did they make any use of that right reason which they cry up so much, they would soon perceive that since they can produce no ancient History of the Creation of the World, and yet are forced to grant it; that they may depress the credit of the Holy Writ, they must needs have recourse to metaphysical Arguments, and prove either that God cannot, or that he will not reveal himself, or at least that he never did: As to us we proffer to demonstrate the affirmative with all the plainness that metaphysical Notions, and historical matters can admit: Let 'em do as much for the negative, and then it will not be very difficult to weigh the reasons of both parties.

But the mischief is that our Deist, tho' one of the greatest pretenders of the Club, has not presum'd to attempt it. Perhaps he foresaw that did he go about to prove that God cannot, nor ever did reveal himself, he would contend for Atheism and not for Deism. My Lord, this is matter of fact that the chief position of the Deists that *no revealed Religion is true*, or that God never reveal'd himself, overthrow's six Articles of their Belief. And to convince the Reader of it, I beg your leave to insert here the seven Articles of the Deist's Faith, in the own words of my Author. (b)

1. *That there is one infinite eternal God, Creator of all things.*
2. *That he Governs the World by Providence.*
3. *That 'tis our duty to worship and obey him as our Creator and Governor.*
4. *That our Worship consists in Prayer to him and praise of him.*
5. *That our Obedience consists in the Rules of right Reason, the practice whereof is moral virtue.*
6. *That we are to expect rewards and punishments hereafter, according to our actions in this Life, which includes the Soul's immortality, and is prov'd by our admitting Providence.*
7. *That when we err from the Rules of our Duty we ought to repent and trust in Gods mercy for pardon.*

Now I aver that without the light of the Revelation the six last Articles

Articles are altogether uncertain, and the latter part of the first equivocal, that is, they can never prove them by natural reason so, as to convince a Philosophical mind. 1. It's indeed incontestable that there is one eternal infinite God; and that he is the Creator of all things as to their Beings or Substances, but how will they prove that he is their Creator also, as to their form or manner of Being? How would they answer an *Indian*, or a *Manichee* that should say 'tis some Angel or finite Spirit, to whom God Almighty gave leave to dispose this world into its present form? and a very bad one too, one of those Apostatick Angels, who seduc'd and enslav'd inferior Spirits, and still keeps 'em Prisoner in several Bodies. 2. If so it be, will continue the *Bramine*, the world is not governed by an infinite wisdom, but by the arbitrary power and malicious fancy of that evil Spirit. 3. and 4. And therefore what worship and obedience ought we to pay to a Jaylor and a Tyrant? 5. As to right reason, may surmize a Sceptick, there is no certainty of any such thing, for perhaps that evil Spirit takes his diversion in cheating us, in deluding our Imagination and offering Phantasms to our Senses; so that the conclusions we draw from these false appearances cannot be true. 6. The future rewards and punishments are no less uncertain in the Hypothesis of Deism, tho' one should grant the immortality of the Soul, as do the Philosophers of the East-Indies and the *Spinosists* here. For they assert that our Soul is a particle or a modification of the Divine Infinite Substance, included in the body as water in a bottle swimming in the vast Ocean: and that as when the bottle comes to break, its water mixes with the Sea, and is no longer distinguishable from it; so after death our soul is confounded with the universal Spirit of the world, and has neither sense nor remembrance of any thing she has done or suffer'd in the body. Moreover, what would our Deist reply to a foolish *Pythagorean*, who tho' he should grant that the Soul is immortal, and remains a separate substance after death, yet should affirm that the finite Spirit who governs this world, is so far from loving Virtue, that he takes pleasure in vexing just men, as a Tyrant does in persecuting honest people, who stick at committing Villanies, to satisfy his Passion.

And thus, my Lord, you see into what abyss of absurdities, these Pretenders to wit would lead us, should we follow the dark light of their wavering reason, instead of the glorious rays of the divine Revelation. What shame is it for mankind, that there be found *Individuum's* amongst 'em, who endeavour to deprive others of the only comfort left 'em against the miseries of this life, viz. the certain

certain hopes of a better State? I own the Deist's Scheme of Religion is more reasonable, than any of the Heathen's; but for this they are owing to our inspir'd Writers. Your Lordship remembers what has been said of *Aristotle*, that he plunder'd the Philosophers who had preceeded him, and by the interest of his Pupil *Alexander the Great*, having gotten almost all the Copies that were extant of their Writings, he burn'd them; and so was the cause of the loss of an inestimable Treasure. Thus would the *Deists* deal with the *Holy Scripture*, if it lay in their power. *Aristotle* either by the fame of having been Tutor to the Conqueror of the *Persian* Empire, or because he explained himself more intelligibly to his Disciples than he has done in his Books, got at length so far into credit, as to be reputed during many ages the Oracle of Philosophy, tho' his Physical Writings be not at this time overvalu'd: It will hardly succeed so well with our Would-be-wits, who have neither the learning nor repute of that great man. And I am sure were they altogether destitute of the helps of Christianity, and left alone to be manag'd by the *Chinese* and *Bramines*, they would quickly be puzzled and confounded.

But suppose they should be able to cope with 'em, do they mean that every vulgar capacity can do as much? Do they not know that the Christian Religion is a most pure and sublime Philosophy, and that hardly one in a thousand is fit for Metaphysical speculations; the education of most People is so mean, the weaknesses and diseases of our body are so frequent and so troublesome, the distractions of this life and its temporal concerns so unavoidable, and our passions so prone to corporeal pleasures, and so averse from spiritual meditations? These are, methinks, the chief causes, why so few men understand Christianity to the very bottom, and why the divine Revelation is so necessary. For tho' a Christian Philosopher may easily confute all the impertinent fancies of the *Manichees*, *Bramines*, *Scepticks*, *Pythagoreans*, which I have formerly alledged; yet all *Christians* cannot reach so high, nor become compleat Philosophers. And therefore God has mercifully been pleased to condescend so far with this weakness of ours, as to provide a shorter and surer way for our salvation, viz. the way of the divine Authority and Revelation, which he has made as plain and safe as can be desired.

This, my Lord, I shall here endeavour to prove, lest this Letter should be taken for a Sermon, instead of a Philosophical Discourse. Matters of Fact are capable of no more than an historical Demonstration, and Histories can be only demonstrated by a constant Tradition, that is, by an uninterrupted succession of witnesses from the
time

time they happened hitherto; so that if I prove the certainty of the Divine Revelation this way, no more can be requir'd of a Christian Philosopher. It seems indeed somewhat uncertain at first sight, there being no less than 24 generations, and 2338 years between *Adam* and *Moses*, according to the *Hebrew* computation, and even 25 Generations and 3943 years, if we follow the *Septuagint*. But when we consider the long age Men liv'd to before the Flood, and some Centuries after, we find that there are no more than five witnesses, who convey'd the antient Tradition from *Adam* to *Moses*, viz. *Methuselah*, *Shem*, *Jacob*, *Levi*, and *Amram* Father to our Sacred Writer. For *Methuselah* being born the 687th year of the World, and *Adam* dying in 930, they may have convers'd together 113 years. *Methuselah* died the very year of the Flood, that is in 1656: and therefore *Shem* had been his contemporary 98 years. *Shem* was born in 1558, and lived 600 years, and *Jacob*'s Birth day falling in the year 2073, it would be a wonder if this pious Patriarch had neglected, during 85 years, to inform himself of the circumstances of the Creation, but especially of the Deluge, whereof *Shem* had been an Eye-witness. *Levi* lived with *Jacob* his Father 87 years, and 37 with *Amram*. So that I may without presumption say, That the ancient tradition has been more safely convey'd from *Adam* to *Moses* during the long space of 23 Centuries, than whatever could come to us, that way, from the times of *Henry VII*. My reasons are, that men are now so short-liv'd, and so taken up with distractions and affairs, so divided into factions, so inclined to deceiving and imposing, that there is but little credit to be given to a hear-say. Besides that the use of writing, printing and publishing Histories is now so common, that the way of tradition is neglected and despised, whatsoever does not stand upon record, being accounted fabulous or at least uncertain. But the simplicity of those primitive times, the extraordinary old age to which men reached, their innocent occupations, that consisted, for the most part, in feeding their Flocks and Herds of Cattle, did naturally incline them to talking and telling Histories. And the conveniency that there was of consulting those who had been Eye-witnesses of those miraculous relations, or convers'd with Eye witnesses, made them afraid of mixing the truth with falsehood. Or if the generality of men were already so wicked in those early days, it seems that the Family of *Eber* did not follow their ill courses, since God vouchsafed to make choice of them in the person of *Abram* to propagate the Truth, and continue his Revelation.

I know but of two Objections, that can be made against this. The first is the long lives of the Antediluvian Fathers, of which however I have given a probable account in the 2^d Letter of these *Memoirs*, p. 14. To which may be added the answer of Jacob to Pharaoh, Gen. 47. 9. *Few and evil have the days of my life been, and have not attained unto the days of the life of my Fathers.* The good Patriarch was then 130 years old, and not so decrepit, but that he lived 17 years more. He could not know, whether he should not attain to the Age of Abraham, 175 years; or of Isaac 180: So that he must needs speak in reference to the long lives of Shem, Arphaxad, Salah, Eber, with whom he might have convers'd.

The 2^d Objection is the rise of Idolatry, which began in Abraham's time. For how is it possible, will it be said, that Shem, Arphaxad, Salah, Eber, being still alive, and perhaps too Ham, Japhet, and many of their Sons, those great Men instructed by Noah himself, should have suffered superstitious practices to creep into the divine Worship, and their posterity to adore Gods of Wood, Stone or Metal, the Work of their hands? See Gen. 31. 30. Josh.

24. 2.

Superstition and Idolatry have had an insensible increase, as have all other corruptions; *Nemo fit de repente malus.* It was, it seems, an ancient tradition, that divers Angels or finite Spirits had the inspection of the world under God Almighty, and were the Protectors of the several Kingdoms and Families. These Guardian Angels, if we may believe the accounts of ancient Histories, did sometimes forewarn those that were committed to their care, either by distinct Voices, or by outward Signs; so that men endeavoured to please them: And as they are naturally invisible, thought it convenient, to assure themselves and their Families of their presence, by some visible tokens or representations. In process of time they came to venerate these representations, meaning that this Worship could not but be pleasing, both to their Guardian-Spirits, and to God Almighty; as relating immediately to these Angels, and mediately to the supream Deity, who had constituted them his Lieutenants. All these practices were sinful, as being introduc'd into the divine Worship, without the warrant of Revelation; and I doubt not but Shem, Japhet, Eber, and the other Patriarchs that were still alive oppos'd 'em with all their might. But is there any thing more common than to see Children despise the advice of a Great grand-Father, and prefer their new Notions to the wholesom counsels of experienc'd old age? This sort of contempt was very like to fall upon those good men, at a time that men were so long liv'd, as that Grand-Children

Children themselves had Grand-Children under them, and were the heads of numerous Families. And accordingly we see *Nimrod* with a confederate Troop of stout men, endeavouring to build a City and Tower, and to get a name, that is, to fix the sovereign power into their hands, (a) *Lest they should be scattered abroad upon the face of the whole Earth*, that is, to enslave the rest of mankind, to make them all resort to this their capital City, and the Seat of their Empire; so that the heads of particular Families, who were then as many petty Princes, should become their Vassals. This design seem'd outwardly well meant, and to aim at the preservation of the unity in Language and Speech, in Religion, Morals and good Manners: But whether that it was undertaken without God's Revelation, or against the Consent of the Eldest Patriarchs, or that those shrewd Politicians, to tye the vulgar the faster, had mixed with the divine Worship, some new bewitching conceits and dazzling Ceremonies, as the Worship of Angels, and of deceased Men: However it be, this Undertaking did not prosper; for by God's appointment, there arose dissensions amongst 'em, so that they went from each other dissatisfy'd. I am apt to look upon *Nimrod* as one of the chief Managers of the business. 1. Because he is call'd (b) *a mighty Hunter before the Lord*: Now in those primitive times, *Hunting* was a quality necessarily requisite in Heroes and great Warriors; forasmuch as men being few in number, Wild Beasts were very troublesom to them, which appears by the instances of *Hercules*, *Theseus*, &c. 2. Because 'tis added immediately after, *That the Beginning of his Kingdom was Babel, Erech, Accad and Calneh*, four Cities situated in the share of *Ashur*, whom he drove from thence, tho *Ashur* himself was a powerful Prince, and even after his expulsion built four great Cities. These Conquests *Nimrod* seems to have made with the remnants of the scatter'd Founders of *Babel*.

Whatever be of these conjectures, Idolatry spread not so fast, as is commonly imagined, over the face of the Earth. For there can be no communication between light and darkness, and God was pleased to communicate with men, that were not of *Eber's* Family, even till the times of *Moses*, as with *Abimelech* King of *Guerar*, *Pharaoh* King of *Aegypt*, *Melchisedec*, *Job*, *Jethro*, *Balaam*. It's not easy to fix the period when this communication ceas'd, but for what reasons it did so, is very plain to me, as I might make it appear, did not the method and design of these *Memoirs* force me to put an end to this Letter. And therefore I shall conclude in contradiction to our Deist, that *Revealed Religion was once and even twice the Religion of all the world*, viz. from the Creation till after the death of *Adam*,

when the *Cainites* having enslav'd the Posterity of *Seth* by Marriages began to tyrannize over the earth, and to corrupt Religion and good Morals, lest the *Sethites* should acknowledge their error and break their Fetters. The second period is but of four or five Centuries, from *Noah* to *Nimrod*; but from *Nimrod* to *Moses*, true Religion and Idolatry were mix'd; the former decaying apace, and the latter growing up, till they were intirely separated, and God's worship preserved amongst the *Israelites*.

This will suffice for the present, in answer to our Deist; for at your Lordship's command, or pious mens desire, I shall always be ready to take again this matter in hand, or any other of the like nature.

July, 20.

LETTER XXVI.

To the Author of these *Memoirs*, by
Mr. R. Sault, Mathematician.

ARGUMENT.

Containing a Geometrical Demonstration of the Infinite Divisibility of Matter.

Reverend Sir,

IN perusing your *MEMOIRS for the INGENIOUS*, for the Month of *May* last, I find too great a complement in the prefatory part of your Letter to me, and I write this on purpose to undeceive such as do not know me, and to assure those that do, that as the Character was neither my seeking nor desert, so also not my pretensions; especially in the former part thereof, I mean Philosophy. The latter part indeed I have too fair a prospect of, not to endeavour a considerable progress in it, my Interest and Ambition pushing me on, tho I would believe that they are both superseded by the

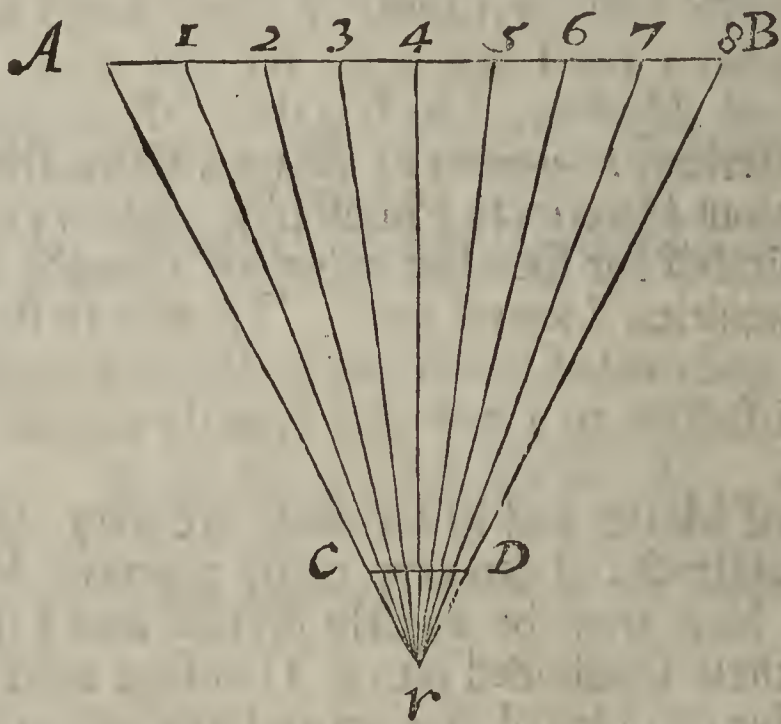
the hopes I have of doing good and being useful in my Calling. Philosophy in the common acceptation is a perfect jest to me, and I never use it, but when I have a mind to unbend my thoughts from those severe applications wherein my *Profession* and Natural Constitution, do sometimes involve me a little too far: I would not be mistaken, as that I should decry Experimental Philosophy, or even such Theories as are capable of a Demonstration upon admitting the first Principles of solid reasoning for *Postulates*; this I think worthy of every wise man's application, in some measure or other, since in every step there are visible delineations of a *Divine Intelligence*, in whom all just and proper Ideas of things do happily terminate.

I have considered your Notions of *Effluvia*, and, not to be rude to my Friend, I think they are very natural to a *Cartesian*, and under that Character worthy their Author: I shall spare my thoughts as to particulars, since I am no *Cartesian* myself, for I can't admit (when I am in the admitting humour) that *Matter* should be subtiliz'd so far as to lose its nature; I mean more particularly as to *extension* and *figure*; tho I am as far on the other hand from the *Aristotelian Occult Qualities*, which is their last refuge for the solving the more mysterious *Phænomena* of Nature. Why there should be so many hot zealous Heretics in Philosophy, or how any thinking man can pardon himself for spending a deal of thought and time about such useless enquiries, I know not. 'Tis easy to start one of these speculations, and treat of it with much learning and acuteness, but with little satisfaction to a man that is in the pursuit of truth and demonstration.

Our Ideas of Matter and its accidents are very distinct and adequate in the abstract; I can very easily conceive how a line of a quarter of an Inch may be exactly divided into a Thousand parts, and each of these subdivided into a Thousand more; but when I come to involve this Idea of division and subdivision in Matter, I'm at a loss, and should find it a difficult undertaking to divide this quarter of an Inch into five Hundred parts, or how to make any two parts precisely equal in all respects. This consideration has suggested to me, that God Almighty's operations in Matter are exactly analogous to our conceptions in the abstract, (which by the way argues our Souls to be of divine Extraction.) We have a true Idea of the sharpness of the Sting of a Bee, or of a Nettle, and when we examine these with the finest Microscope, we find they terminate according to the Idea we have of them; But when we look upon a Needles point (our own operation) how craggy and blunt.

blunt it does appear ! We have a true notion of Smoothness, and find it in the scales of a Flea and other crustaceous Insects ; but our finest Glass, or polish'd Marble is so extreamly rough and uneven, that the eminencies will reflect the light, as the sides of rising Hills and Mountains do.

But I have digress'd too far, my first design being to demonstrate the *infinite divisibility of Matter*, or that Matter in its own nature can never be divided so small as not to admit of subdivision : This subject has been reviv'd and managed pretty smartly lately in Town ; and finding new difficulties started, I have concluded with myself, that perhaps one good demonstration (and I suppose the subject will bear it) may possibly stifle it again, and set these Gentlemen upon the pursuit of some nobler and newer Hypothesis ; I shall desire no other *Postulate* but what has been granted by all that pretend to understand demonstration, *viz.* That 'tis possible to draw a right line from one point to another.



Let the right line AB be divided into such a number of parts beyond which there is no farther division, suppose into 8. Let CD be a line of the same nature and properties in every respect with AB only 6 times shorter ; draw the lines (*per post.*) $Ar, 1r, 2r, \&c.$ it's evident that the line CD shall be cut 8 times, that is, as often as the line AB . But by Hypothesis the line CD is of the same nature and properties as AB , therefore AB may be divided proportionably with the line CD , *viz.* into 6×8 or 48 divisions, equal to 8 divisions, which is absurd. If yet it be urg'd, that 48 divisions is the

July, 1693.

211

the number beyond which the line *AB* cannot be divided; make these 48 divisions, and draw the lines *Ar*, *1r*, *2r*, and so on to *48r*, 'tis evident that the line *CD* will be also divided into 48 parts, which being of the same nature and properties with the line *AB*, the line *AB* will be capable of 48×6 , or 288 divisions, which drawn to *r* as before will divide the line *CD* into 288 parts, but $6 \times 288 = 1728$ parts for the line *AB*, and so on *ad infinitum*, which was to be demonstrated; the latter part of this demonstration, is a demonstration by *Induction*, used by *Dr. Wallis* in his *Arithmetic of Infinites*, and now admitted universally, both at home and abroad.

July, 22.

LETTER XXVII.

To Mr. Sault Mathematician, in Adam's Court, Broadstreet.

ARGUMENT.

That there is no such thing in nature as Mathematical Points. The Difference betwixt a Mathematical and Physical Division. That Matter is not really or Physically divisible in Infinitum demonstrated. That neither the Extensibility of Gold, nor Plants and Animals delineated in their Seeds do prove this Infinite Divisibility. Instances of Geometrical Demonstrations stretched too far. Wherein lies the Mistake of the foregoing Demonstration.

S I R,

BY your ingenious Letter, you have done just as those fair Ladies, who answer the complements their Lovers pass upon their beauty; with such a modest and lively blush, that it makes them the more admired: You have excused your self from being a Philosopher with so uncommon observations, that were not your dealings fairer in the ordinary occasions of life, I would not have for

for you as high an esteem as I have. And therefore I can hardly think that you should earnestly intend to prove by your Demonstration that Matter is really and in it self infinitely divisible. You know, Sir, that there is *no such thing in nature as a Mathematical point*, that is, a body so small as to have neither length, breadth nor depth; for then it had neither extension nor impenetrability, and it would cease to be a body, even in the sense of all Philosophers whatsoever. Of such points, I grant, there can be an infinity in the smallest atom imaginable, because they are nothing real, besides the various contemplations of a mind, which derives its extraction from the Divine Intelligence, and is created to admire and search into the infinite perfections of God during all Eternity.

2. There is then a great difference betwixt a Mathematical and Physical Division. By the former, the ten thousandth part of an inch may be divided into innumerable parts, because those parts have no extension, and consequently are no bodies at all: But the division performed the latter way has its limits, which are not the more uncertain, because unknown to us.

3. To demonstrate this real difference betwixt a Mathematical and Physical division, as far as I am able by the little insight I have in Philosophy and Mathematicks, I shall only suppose that common Axiom, *The whole is greater than any of its parts*, with the ordinary definitions of Body and Infinite, *viz. Body is a substance extended and solid or Impenetrable; Infinite is that beyond which there is nothing, or to which nothing can be added*. This being granted, which not one, for ought I know, can deny; I argue thus: In your Scheme the Lines A B and C D, suppos'd to be of the same nature and properties, are either Mathematical lines consisting of Mathematical points, that have no extension at all, or are corporeal lines made up of Physical points, that is, of particles extended and solid: If the first, your Demonstration proves nothing in relation to Physicks, since they are not Physical lines that are thus divided; but only Mathematical, that is, your Division is not real, but imaginary or intellectual; it being not performed on any body, but only within your mind. If the second, I urge thus: By your hypothesis, tho the lines A B and C D be of the same nature and properties, yet A B is six times longer than C D, and therefore both cannot be infinite nor infinitely divided. The consequence is plain, *Infinite is that beyond which there is nothing, or to which nothing can be added*; but six parts of A B can be added to C D, or C D must be multiply'd six times before it can be equal to A B, and therefore C D cannot be infinite. Now that such a portion of Matter as is not infinite in

itself, cannot be infinitely divided, needs, methinks, no demonstration; however, if you please, I may prove it thus: If CD , the sixth part of AB , can be infinitely divided, CD the sixth part, is equal to the whole AB , which cannot be more than infinitely divided; but the whole is greater than any of its parts, and therefore if AB can be infinitely divided, CD , the sixth part of AB , cannot be infinitely divided, unless you would say that one Infinite can be greater than another, against the very notion and definition of Infinite, that it is *that beyond which there is nothing, or to which nothing can be added*; whereas six parts of the supposed infinite line AB can be added to the suppos'd infinite line CD .

4. If to this, you be pleas'd to add what I endeavour'd to prove in the X Letter of these *Memoirs*, p. 63, and 64, that the least particles of Matter cannot be fluid and flexible, but must needs be solid and rigid corpuscles, and consequently that the subtil matter of *Descartes* is a meer figment; you will be apt to believe that there is really no such thing as an infinite Divisibility of Matter, no more than an infinite corporeal extension. Infinity is an essential and incommunicable property of the Supream Being, of which he has been pleas'd to give us some notion, and to print in us an earnest desire of its contemplation. But some men are so misguided by passions and prejudices, that they will rather suppose a pretended infinity in the smallest Atom imaginable, than to acknowledge the Eternal, Supream and Infinite Being.

I know the incredible extensibility of Gold, and I may even grant to *F. Malebranche*, that God could, if he would, frame a World as distinct as ours, with a Sun and Seven Planets turning about it, and all sorts of Creatures that are in them, within the space of a Ball of a quarter of an inch diameter. I grant this, I say, because my Reason and good Microscopes assure me, that Plants and Animals are delineated in their Seeds, and have all those very parts, which come by the increase to exert themselves, and to grow sensible to the Eyes, how small and inform soever these Seeds may appear at first; and whatever be the changes through which they pass. But after all, there could never be as many particles in that suppos'd little World, as there are in this real one, unless the clearest Idea's we have, *viz.* those of Numbers and the Multiplication of Unities were false or doubtful: Neither can there be any proportion between finite and infinite, tho we should multiply numbers, or make additions of portions of Matter, during all Eternity.

5. But can then a Geometrical Demonstration be false? no, but it can be stretched too far. Geometricians suppose points that have no extension at all, Lines made up of those points extended in length, but without any breadth or depth. I grant an infinity of such Lines may be drawn from an infinity of such imaginary Mathematical points, to any such others; because you draw them not upon Paper or any corporeal substance, but within your Mind, that is altogether Spiritual, as well as your Idea's. And that would have appear'd even to the Eye, had you undertaken to draw the 48, 288, or 1728 Lines or Divisions whereof you speak.

6. Those great Mathematicians and Philosophers, *Robault, Arnaud, Mallebranche*, are methinks fallen into the like mistakes, endeavouring to prove their pretended Divisibility of Matter by demonstrations of this nature. However this does not make Geometry uncertain, it being not the fault of the Art, but of the Artist. Thus in Mechanics, Mathematicians suppose Matter without gravity, and equal in all its parts; which suppositions are necessary to make their Demonstrations plain and easie. But as there is no such Matter in the World, it oft happens that a vast number of unforeseen difficulties arise, when they will put their speculations into practice. And even those who have made, as they imagine, a competent allowance for this gravity and various complications, see oft new difficulties starting on a sudden.

7. You tell me, Sir, you are no *Cartesian*; and therefore I would not have you seduc'd into a mistake by the specious pretence of a Mathematical Demonstration. I know there is the greatest certainty in them, provided they be rightly apply'd, and all equivocation whatever carefully avoided, which, by your leave, Sir, seems not to be so in yours. For by the institution of Geometricians, the word *point* is a *purum Ens Rationis*, the Mathematical supposition of a Body so small as to be consider'd without any relation to its three Dimensions: and likewise a right line is supposed to be a Body extended in length, without any breadth or depth. Keep to this your Geometrical sense, and I'll grant your *postulate*. But if you pretend that it is possible, at any time, to draw a right physical, real or corporeal line from any one physical point to any other, I beg that you will be pleased to prove it; promising you that when you have taken that trouble, I shall be ready to admit the infinite Divisibility of Matter. In the mean while I have an Argument, which I am resolv'd to stick by, *viz.* That since all the parts taken together can be but equal to the whole, whenever I shall see a portion of Matter terminated on all sides, I may safely conclude that it does not contain an infinite number of parts. As.

July, 1693,

215

As to the commendation you bestow upon me of being a *Cartesian*, if the Disciples of the great *Descartes* will allow of it, after they have read my *Works of the Learned*, Art. v. p. 13. and Art. xxxvii. p. 123, together with these *Memoirs*, Lett. iii, x, xiii and xv; I am content to give them the Hand of Fraternity.

July, 24.

LETTER XXVIII.

To the Author of these *Memoirs*, by
Mr. R. Sault, Mathematician.

ARGUMENT.

A Defence of the Position contained in the XXVI Letter, That Matter in its own Nature is infinitely Divisible. Objections against the Corpuscularian Philosophers.

Reverend Sir,

I Take it extream kindly at your hands, that you were pleased to send me what you have design'd as an Answer to my short Letter, before it was committed to the Press, and I shall endeavour to clear those Philosophical Objections that you have made, not so much for the sake of Contest, as the Reputation of a Mathematical Truth.

§ 1. As previous to your attack, you tell me, That I know there's no such a thing in Nature as a Mathematical Point, that is, a Body so small as to have neither length, breadth nor depth, for then it would neither have extension nor impenetrability, and would cease to be a Body, which I grant, and desire you to remember it hereafter. We call any Quantity a Mathematical Point how big soever, provided we conceive it without distinguishing its parts; far differing from that of Zeno: And by a line (to prevent another definition of it) we conceive a Quantity made by

H h 2.

the

the motion of such a Point. See your own Countrymen *De Chales, Par-*
die, &c. should we say any thing else we should speak unintelligibly,
 and instead of having certainly Mathematick Operations, we should
 be at a loss in the very Elements.

§ II. In your second Paragraph, you tell me *there's a deal of diffe-*
rence betwixt a Mathematical and Physical Division, which I also sub-
 scribe to.

§ III. In your third, you proceed to demonstrate it; and put this
 Dilemma upon me, viz. *either my Lines AB and CD are made up of*
Mathematical Points or Physical; If the first, the Division will be only ima-
ginary or intellectual, being not to be perform'd on a Body but within ones
Mind, and therefore (for I'll make the omitted Consequence) my
 Actual Mathematical Division proves nothing to the purpose. If
 the second, *AB being six times longer, that DC both can't be infinite nor*
infinitely divided, for (as you add afterward) infinite is that beyond which
there is no dividing, but CD may be multiplied six times before it can be
equal to AB. Therefore *CD is not infinite if AB be infinite, unless*
the part is equal to the whole, or some infinities greater than others. This
 Sir, is the strength of your Argument in a little shorter terms. To all
 which I answer. If you had duly considered my position, you would
 have found these words, *my first design being to demonstrate the infinite di-*
visibility of matter, or that matter in its own nature, can never be di-
vided so small as not to admit of subdivision; thereby explaining what
 I meant by an *infinite indivisibility of matter,* and the Term *in its own*
nature is as Physical an expression as I can use, if I were to make a
 second choice of my words, so that the former part of your Dilem-
 ma is needless. In the second part you palm upon me a fresh word
 infinite, taking it for granted that I had affirm'd that either one or
 both of the lines were infinite; then you define what infinite means;
 and upon a *Petitio Quæstionis,* you fall a concluding, that if so, then
the whole is equal to its parts, and one infinite greater than another. Now
 Sir, I hope there's a very comfortable distinction for me, betwixt a
 thing that is Physically infinite, and a finite thing infinitely divisi-
 ble; 'tis plain to me that whatever is infinite is not divisible at all;
 for divisibility supposes parts, but partibility and infinity were incon-
 sistent terms when I studied Philosophy; but what is finite in its
 own nature, is also in its own nature capable of an infinite division,
 from my first demonstration.

§ IV. But since you are pleased to correct my Error, as to your
 being a Cartesian, affirming your self to have imbib'd more of the
Corpuscularian Principles, I may undertake to prove from those also
 that my assertion is valid: You were pleased to tell me in Paragraph

1st which I desired you to remember, that *there was no such thing in Nature as a Mathematical Point; or a Body so small as to have neither length, breadth, nor depth;* and in Paragraph 4th the least Particles of matter must needs be rigid Corpuscles, which exactly agrees with what I have said in my former Letter, viz. *I can't admit that Matter should be subtilized so far as to lose its Nature, I mean particularly as to extension and figure.* Now I affirm that your least particles of matter which you call Corpuscles, are of some sort of figure, as Cones, Cubes, Cylinders, Pyramids, regular or irregular; you suppose 'em rigid and pointed, if so, they have sharp Corners, but these Corners are less than the whole Corpuscle, and if separated from it there remains perhaps a Globular figure or some other, for you must admit the Accident of figure, or else Corpuscular Philosophy falls to the Ground and with it the Definition of matter it self. Now Sir (to let Mathematics alone) this whole Corpuscle or little tiny diminutive Body is extended (according to your own Definition of *Body*, Paragraph 3.) if extended (according to the Idea which all the world has of extension) it has parts equal to the whole, if parts divisible, if divisible, it's all that I contend for. I matter not whether Matter is actually divided or no; but whether it is divisible in its own nature is what I contend for; besides, amongst all our Modern Philosophers, *Passive* and *divisible* makes up a considerable part of the definition of *Matter*, which also secures my Assertion.

I could proceed to prove what I have asserted Mathematically, as that the two sides of a Triangle must be equal to one, whenever *C D* is not cut into as many parts as *A B*, and by a hundred more absurdities too tedious, and indeed useless to enumerate; but my way of proving it by Induction is what I insist most upon, because I see that it obviates all the Philosophical distinctions that can be made; and 'tis (I must repeat it once more) what the greatest Modern Mathematicians have admitted, as *Dr. Wallis*, *Mr. Newton*; and abroad, *Bullialdus* and others.

I might have consider'd what you have urg'd in the 6th and 7th Paragraphs, but they all depend upon the 4th, which, I hope, is fully answered. Only I can't but think it a hardship upon me to be call'd upon to prove one of *Euclid's Postulates*, as *the possibility of drawing a right line from one point to another*: Which I beg the liberty to think as evident already as Motion, which must be either in Curve or Right Lines, &c. and if one is possible, then both, from the same principle; if neither, there is no such thing as Motion, and so we may be put to prove principles *ad infinitum*; but to prove without some Axioms and Postulates to build upon, is what I dare not undertake.

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I don't know whether in the great haste I wrote this, I may have let any thing fall unbecoming my own Character to give, or yours to receive; if I have, I desire to be excus'd, since I have done nothing of that nature maliciously or designedly: and I doubt not but I have light of such a Judge (tho my opponent in this case) as is not only capable of making a true judgment of this Defence, which is more Philosophical, and by consequence more your Province; but also one that thinks it no disgrace to subscribe a truth tho to an Enemy; and such a one as is, and always shall be Ambitious of testifying how much I am

July 25.

Reverend Sir,

Your Faithful Humble Servant,

R. S.

LETTER XXIX.

To Mr. Sault Mathematician.

ARGUMENT.

An Answer to the foregoing Letter. The Definitions of Mathematical Points and Lines, and of Infinite cleared off, and Euclid justified. Objections against the Corpuscularian Philosophers answered. The first Elements are most minute Globules. Why Matter is contiguous? Descartes, Malebranche, and Gassendi confuted. The Author's Hypothesis.

S I R,

I. **I** See our dispute is at an end as to the Geometrical part, since I need but to clear my definitions of Mathematical points, lines and infinite, which is not very difficult to do; for the first are taken out of Euclid (a): *A point is that which has no part: A line is a length without breadth.* These very words shew there is really no such thing in nature as Mathematical points and lines; and both the comment you make upon them; and that of *Dechales*, to which you

(a) Defn.
I, 2. l. 1.

you refer me, confirm me in my opinion, that your Mathematical points and lines are not things really extant, but suppositions made at pleasure, as oft as you have occasion for them. For you say we call any quantity a Mathematical point, how big soever, provided we conceive it without distinguishing its parts, and by a line we conceive a quantity made by the motion of such a point.

To be plain with you Sir, good old *Euclid* was more sincere than you Gentlemen his Interpreters, and perhaps more cautious; for he owns almost in express words, that his points and lines are not real things, but he involves himself in no contradiction, since he draws, for ought I know, no physical inference from his Geometrical definitions. It's not so with you, Sir, For let your line *AB* be divided into ten thousand parts, if possible; so that a suppos'd Mathematical point in the line *AB* be the ten thousandth part of it: let a right line be drawn from each of these points to *r*; if each of those lines cut the line *CD*, as they must in your hypothesis, the line *CD* being six times shorter than the line *AB*, it clearly follows that your Definitions are false, or liable to a plain contradiction. For then a Mathematical point cannot be any quantity, how big soever, nor a line a quantity made by the motion of such a point; unless you admit the penetrability of Matter as great an absurdity as any of them all.

II. You seem to avoid them by owning that there is a deal of difference betwixt a Mathematical and a Physical Division. But granting this absolutely, as you do, it will follow that a Mathematical Division being nothing else besides a sport of our Mind, that is created for God, or to live eternally, and uses the power it has receiv'd from him of contemplating Infinite, as I may say by parts, in dividing Matter till it be wearied out; then your Geometrical Demonstration will signifie nothing, because it's apply'd to a physical or real thing, or because you intend to prove that Matter in its own nature is infinitely divisible.

III. As to my definition of Infinite, I did not say it's that beyond which there is no dividing, as you are pleas'd to quote me; but it's that beyond which there is nothing, or to which nothing can be added. I consider'd my self as in the center of that Infinite all, and looking round about me on all sides, I saw no end where-ever I cast the eyes of my understanding, and therefore I concluded Infinite is that beyond which there is nothing: and I appeal yet to the conscience of all mankind, whether this is not the true notion of Infinite. The Definition of *Aristotle* (b) that Infinite is *ἡ ἀέτι τι ἔξω ἐστί*, that whereof there is always something behind, differs only from mine in that his gives with
positive

(b) *Ph. 1. 3.*

positive words a negative Idea of Infinity ; whereas mine with negative words affords as positive an Idea of it as can be conceiv'd.

I leave the Reader to judge of your answer to my Dilemma's. I shall only observe that your distinction is not so comfortable as you suppose. For tho I willingly grant you, that *whatever is infinite is not divisible at all* ; yet it follows not, either from thence, or from your first demonstration, that *what is finite in its own nature is also in its own nature capable of an infinite division*, until you have prov'd that a finite body can contain an infinity of parts, without destroying that common notion *the whole and all its parts are equal*.

IV. I come now to your objections against the corpuscularian principles, which, if I conceive them right, may be reduc'd to these two heads. 1. That the least particles of bodies must needs have some figure or other, either regular or irregular ; if so, then the corners of these particles will be less than the whole particle, and therefore may be separated from it. 2. The least corpuscle in the world is extended ; if extended then it has parts equal to the whole, if parts divisible, if divisible, you have all what you desire ; for you care not whether Matter is actually divided or no, but whether it is divisible in its own nature, is what you contend for.

To this I answer, 1. That the least particles of Bodies are so small, that there is no Agent in nature that can make 'em smaller, or divide them farther, which must necessarily be so, if matter be not infinitely divisible, as I contend, or rather if the whole and all its parts be equal, that is, both finite. 2. And therefore, tho these particles be extended and have parts, yet it follows not that they are separable, no more than the parts of the infinite space, which you own to be indivisible in its own nature, § III. The same reason holds in both, for divisibility and the utmost minuteness are as inconsistent terms as *partibility* and *infinity*. 3. I am not bound to suppose the first Elements or least Corpuscles angular, I may conceive them perfect globules, for this figure joyn'd to their unimaginable smallness, will give no hold to exterior Agents.

But here rises a new difficulty, how can will you say, these globules hang together, since they touch one another but at some points of their superficies ? Sir, this objection does not hit me more than other Philosophers, for do you know of any, who ever gave you a satisfactory account of the contiguity of matter ? 1. The Rest of *Descartes* will not do, for besides that Rest is not a positive and efficacious quality : To say that Bodies are hard or contiguous, because their parts are in rest one by the other, is to say one and the same thing in different words. 2. The subtil matter, which *Malebranche* means

to employ more successfully, can't make it up neither. For passing through all the pores of Bodies as a most subtle and movable substance, it is fitter to separate 'em, than to keep them united; besides, what shall keep together the first particles of the subtil matter? If he say they remain united because of the plenitude of the World, or because there is no empty room for them to fall asunder; by the same reason I shall prove that motion is impossible (a), and consequently that his Hypothesis is false, since we are conscious to our selves (a) See Lett. 3. of our own motions, and of those of several bodies. 3. Let's now hear *Gassendi* and the Modern *Epicureans*. Bodies, say they, hang together, because the first Elements are angular Corpuscles of various figures, more or less firmly complicated, according to the degrees of compactness in different Bodies. But if these angular corpuscles are of various figures, they are also most probably of different size; if so, then they can act one upon another, break mutually their corners, and render each other lesser; so that they cannot be indivisible nor consequently the first Elements. 4. What if we should say that the minutest globules are viscous? No, this cannot be; for clamminess seems to be a quality of compounded bodies, and to proceed from branched particles. 5. What then? pray, Sir, look; I have it, if I am not much mistaken. Matter is contiguous, because the World, (I speak of this terraqueous Globe, for of the rest I know nothing, but by uncertain conjectures) the World, I say, is as full as it ever can hold, or rather as it can consist with the various constitution of bodies; so that the minutest globules cannot find vacuities so big, as to suffer them to fall totally asunder, or to disperse and go very far from each other. However this does not hinder motion, condensation, and dilatation. 1. Because the empty spaces, interspersed among the first globules, may allow them to move about each other, whensoever they are forc'd to it by an exterior agent. 2. Because no sensible body is made up immediately of the minutest globules, but of other angular corpuscles, and this of others again; not *in infinitum*, but I am sure there must needs be made a vast number of subdivisions, before one could come to the first Elements. And therefore as these angular corpuscles passing through so many and various combinations must needs be complicated different ways; there is no difficulty in this Hypothesis to explain the several degrees of hardness and softness, compactness, and fluidity, condensation, dilatation, &c.

¶ V. For the rest, Sir, I am too civil for putting you to those hard shifts of proving one of *Euclid's Postulates*, viz. the possibility of drawing a right line from one point to another; provided you draw no

Physical inference from a Mathematical supposition. Nay, I have so good an opinion both of you and your demonstration, that I am almost sure, I could find as much to say against any other whatsoever; tho it were set up, even by the famous *Wallis* and *Newton*; because I am confident there is no such thing in Nature, as the infinite Divisibility of a finite Substance.

July, 26.

LETTER XXX.

To the Honoured Mr. *Joseph Raphson*,
Fellow of the *Royal Society*.

ARGUMENT.

The Author's Excuse for not putting his Name to Translations. An Account of a Woman that took Worms out of the Gums, Tongue and Face of several Persons. That these Worms breed in great Numbers, Rottenness of Teeth, Canker and Ulcers produced by them. An Account of Sir Theodore de Mayerne. That there is no equivocal Generation. That these Worms came out of Eggs of Flies, proved by an incontestable Instance. That all flying Insects have been of Worms, but all Worms do not become Insects.

Honoured Sir,

IF my present circumstances would allow to keep my Works by me, that I might review them at leisure hours, till I brought them somewhat near the perfection that *Vangelas*, *D' Ablancourt*, and *Sir Roger L' Estrange* have given to their Translations, I would not stick to prefix my name to them. But being reduc'd to the unhappy State of *Du Ryer*, you will not, I hope, be offended, if I durst not
subscribe

subscribe my name to such an inconsiderable trifle as the *Latin Translation of Rohaults Mechanics*. For tho' it be an excellent Treatise in itself, and worthy in that respect to be dedicated to so great a Mathematician as you are: yet 'tis accounted so mean a thing to translate out of *French* into modern *Latin*, that a man who has any sense of honour will never boast of a performance of this nature.

Sir, tho' these *Memoirs* be in my Judgment as tolerable as any thing I ever writ, yet are they very far both as to the Stile and the Matter, from that Ideal Perfection I would give them: neither may I hope with the few helps, leisure and encouragements I have, to make them much more compleat than they are; so that I know not whether I had not as good to desist. And I was like to have left off this Month, being discouraged by my Booksellers, had not a worthy and learned Physician, a Fellow of your Society, Sir *Theodore De Vaux*, communicated to me some of his, and his incomparable Godfather Sir *Theodore Tarquet de Mayerne's* Observations, with promise of helping me to others no less curious from time to time. This kindness was the more acceptable to me, that it was altogether unsought and unexpected. And now having so great a prospect for Physic, I am minded to try whether I cannot prevail with other ingenious Acquaintances for other things, especially with you, Sir, who have such an universal Learning in all the parts of Mathematics and Philosophy, and have penetrated into the most secret recesses of *Algebra*.

The Observation I shall now communicate to the World under your name is, methinks, pretty uncommon. A Woman called *Sarah Hastings*, living at *Holm* in *Huntingdonshire*, a Mile from *Stilton*, had attained to so great a skill, as to discern at first Sight, whether any Person had Worms great or small in his Gums, Tongue or Face. These Worms, as she affirmed, are the cause of the Rotteness of the Teeth, of Pustules and many other Putrefactions, as shall appear hereafter. She drew them out of any part soever in three or four minutes, using only the Quill of a Goose, or Writing Pen, sharp-pointed, or cut as a Tooth-picker; she pierc'd the afflicted part so dexterously with her Quill, that the Pain was almost insensible: Then she threw the extracted Worms into a Glass of clean Water, where they appear'd to have a round and red head, the rest of the body being white.

All this Sir *Theodore de Mayerne* himself, saw this Woman perform, at *Whitehall*, in K. *Charles I.* presence, in the year 1642, as I have it under his Hand and Cifer. She was then 65 years of Age, and had communicated her Art to none but her Daughter, who

was already grown to be almost as exquisite as her Mother. I know not of any Author, who has mentioned any of these Women, who yet deserv'd so well to be remembred to Posterity. The Mother is apparently dead, but I should be glad to know what's become of the Daughter, whether she is dead too, and that important Secret with her?

To convince the World of the Usefulness of these Women's Skill, I need but transcribe the accounts which a Friend of Mr. *De Mayerne* sent him, in a Letter that I have in Original, dated *December 14, 1641*, and subscribed *J. De Laval*.

'The first time I saw her try her Skill, says my Author, was about
'16 years since at the late Earl of *Bullingbrook's*, at *Bletso* in *Bedford-*
'*shire*, where upon the first inspection of the Mouths of divers Per-
'sons, she instantly declared who had, and who had no Worms,
'which she with an admirable dexterity took out with a Quill.
'They were so small as that they would not appear, till they were
'put in water, and there they might be plainly discerned to stir;
'some of them being as small as threads, and yet their annular fi-
'bres by which they moved, were very visible. At that time a
'Daughter of the Lord *S. John*, Son to the said Earl, had on her
'nether Lip a red spot, which sometimes would be pustulous, but
'for the most part, appeared only as the seat of a small Wart. The
'*Operatrix* no sooner spy'd this Lady, but she assured her Father that
'it was a Worm, and if not prevented, that it would breed and
'become an Ulcer; whereupon my Lord was perswaded to let her
'take it out. To avoid all pretence of Legerdemain, a new Quill
'was prepared and made fit by my Lord himself; and put into her
'hands by him, with which, she in a trice discover'd the place
'where a Worm was lodged in the flesh, which before she took it
'out did evidently appear to us all that were present; and after she
'had pull'd it out was alive; and crept very nimbly upon a Plate; it
'being white with a red head, very like to, and almost as large as
'that which is found in a Nut. The Lady's Lip was perfectly well
'within three days after, no sign at all appearing, where the Worm
'had layn.

'The next operation of hers, which I had the fortune to view,
'was upon on *Thomas Stedams*, a Lieutenant, who about 7 years
'since was quartered at my House. He had been long troubled
'with a sore Throat, as he called it; one day as the Surgeon of the
'Regiment was dressing him, I happened to see the place affected.
'His Tongue was in some places very raw, and seem'd to be much
'inflamed. There were many bleakish pustula's towards the root
'of

of the Tongue; betwixt which, the flesh appeared black like a Scar. All the Medicines applied by the Surgeon did rather increase, than any ways assuage the grief, which was accompanied with most exquisite pain, especially during the time of dressing. In fine, all remedies being fruitless, I persuaded him to send for this Operatrix; who upon the first view told us, that the whole disease was Canker-worms, as she call'd them, which were suffer'd to breed in that part, and by the application of Physicks contrary to them, but not powerful enough to exterminate them, were driven towards, or into his Throat: where, if they were not without the reach of her Quill, she would destroy them. And accordingly, she endeavour'd to do it, and in my own presence, did at several times take out with her Quill to the number of 27 Worms, many of which I have seen half within and half without the flesh; and being taken out they appeared as big as large Maggots, being all white with red heads as the others above mention'd. The part of the Tongue from which they had been taken grew in few days whole, and without any excoriation or pustula's. But a bed of the said Worms being, as she said beyond the reach of her Quill, she was forced to give over the cure, telling us that in a short time those Worms would eat his Throat in pieces, which accordingly ensued, together with the death of the Patient, few Weeks after his departure from my House.

The third experiment I had of her skill was upon myself. Almost three years since, towards the end of Autumn; the third great Tooth in my nether-jaw, on the right side, was seized for divers days together, with a stupor, or that kind of pain, which we call the Teeth set on edge, so that I could not endure to chew on that side. This having continued a month without intermission, the Tooth became sore and very loose, which about the beginning of *December* turned to an excessive aking, that tormented me most immediately after Meals. This gave me suspicion, that it might be occasioned by somewhat extraordinary, whereupon I repaired to this Woman. As soon as she look'd in my mouth, she told me my Gums were very foul, but that she did not certainly know, whether the pain proceeded from a Worm or no, which yet she should quickly discover, if I would hold a while a little Aniseed water in my mouth. I did it, and she having look'd again in my mouth, told me, that it was a Worm or two lodged just under the Tooth affected. And therefore I desired her to shew her Art upon it, which she did, and finished the cure in less than four minutes, having first with her Quill only discovered to some Gen-
tlemen

‘ tlemen, that were with me, the worms half lodg’d in the Gums under the Tooth, which being taken out crept upon a Trencher, being of the same size and colour before express’d. Immediately the pain ceas’d, and the Tooth in few days became fast, nor have I ever since been troubled with any pain in that Tooth, tho in some of the other side I have.

‘ I saw a forth Experiment in *March* last, upon one Mr. *Posthumus Gannock*, a Gentleman, who by a fall had broke the flesh on the ridg of his Nose, which by several accidents was twice or thrice renew’d before it could be perfectly skinn’d over. This occasion’d a great tenderness and discolouring on the place affected, which after a years time turned to a plain sore, whereupon, all other remedies proving fruitless, I perswaded him to go with me to this woman it being then about the middle of *January*. As soon as she saw it, she told us, it was not yet ripe for cure, the worm not being come to perfection, and so dismiss’d us, desiring the Gentleman to come again in *March* following, as he did. Then she took out two such worms, as I have before described, and the sore became quickly whole, without any application whatsoever.

‘ I could give you some other relations of the same kind upon my own experiment, but I shall only add one more concerning a Maid of about 10 years of age, named *Mary Barker*, who from one small Pustule in her Lip, had all her face overspread with a very fowl Ulcer, that had eaten into her Nose and Cheeks. She had been under the cure of two excellent Surgeons, but could find no remedy, till this woman took her in hand, and got her perfectly cured within six Months, by taking above sixty worms out of her Face at several times, without using any outward Physick. The affected parts appear’d only, as tho she had been much pitted and spoil’d with the small Pox.

I can give no account of this Mr. *Delaval*, only as far as I can judge by the spelling and style, in which I have made but inconsiderable changes, he was a Letter’d man, and perhaps a Physician too. But the witness I most rely upon is Sir *Theodore De Mayerne*, a man too knowing to be deceiv’d, and too sincere to impose upon others. He was Son to *Lewis Turquet De Mayerne*, who has written the History of *Spain*, and was Lieutenant General of the Ordinance to *Henry IV*. But that Prince preferring the peaceable possession of the *French Crown* before his Religion, many Protestants deserted his Service, amongst others Lieutenant General *De Mayerne*, who retired to *Geneve* where our Author was born in 1597.

He took his degrees at *Montpellier*, then came to practice Physic at

at *Paris*, where in a short time he got so great a name, that he was honour'd with the quality of Physician in ordinary to K. *Lewis XIII.* In 1621, he was called into *England* by King *James I.* made his first Physician, as also to Queen *Ann*, then to King *Charles I.* his Queen and all the Royal Family; besides that he was consulted by many Kings and Queens, Princes and Princesses, to the number of 24, as his worthy God-son and Disciple Sir *Theodore de Vaux* has assur'd me. Tho he was one of the learned'st men of his Age, especially as to the Practical part of Physic, and the choice of Specific remedies, yet he published nothing, that I know of during his life: But his foremention'd Godson Sir *Theodore de Vaux* has enrich'd the World with a Collection of his Remedies, under the Title of *Praxeos Mayer-nianæ Syntagma*, printed for *Sam Smith* 8°. 1690. and he promises a 2^d part, as well as his Physical Counsels, a specimen of which, that has been communicated to the World, has been highly esteem'd by the most famous Physicians of this Time. Something has been printed of this great man, this very year at *Lyons*. 8°, under the Title of *La Pratique de Medecine de Theodore Turquet de Mayerne, Conseiller & premier Medecin du Roy Charles II. & de la Reine d' Angleterre*. I know not whether this Book is a Translation of that Collection that is come out here in Latin. But certainly the French Publishers and the Journalists of *Paris* (a) have written upon very bad Memoirs, when they make Sir *Theodore de Mayerne* who died in 1655 before the Restoration, Privy Counsellor, and first Physician to King *Charles II.* and his Queen, and when they affirm him to be born at *Aubonne*, a Lordship with the Title of a Barony belonging to him. Notwithstanding the change of the Times, Mr. *De Mayerne* maintain'd himself in great Reputation and Credit till his Death; left a hundred thousand pound sterling behind him, and two Daughters, who were marry'd in a most Noble Family of the Protestants of *France*, viz. to two Brothers of the House of *La Force*, the Marquess *de Cuignac*, and the Marquess *de Montponillan*. (a) n. 18.

All this being considered, I doubt not in the least, but that there were Worms taken out of the Gums, Tongue, and Face of several Persons by this Woman. The only question is how they came, or were generated and bred in those parts. There is nothing easier than to suppose an equivocal Generation; but this does not satisfy an inquisitive mind; besides the oddness of that Hypothesis, contrary to the notion we have of dull and unactive matter, and the admirable composure of the least animals, in which Microscopes discover to us all the parts necessary to life, as perfect as in Horses and Elephants. This, Sir, I need not prove to you, nor to the most
part

part of those who read my Memoirs in this learned Age. Only I shall observe. 1. That we know not any exterior agent, destitute of understanding, nor even any finite Intelligence, that can order the parts of such matter, as is not prepared to produce animals, in that disposition which is necessary to create life and a kind of spontaneous motion. 2. That Nature, or that constant order instituted by God for the propagation of living Creatures, never mistakes so far as to produce a species for another. 3. That all the Art of Men could never procure the Propagation of a new sort of animals; for those who are produced by the copulation of Males and Females of different kinds, as are *Mules* and *Jumarres*, do never breed, God having taken care lest men should mimick the Works of his Creation. 4. That a vast number of little Insects, and Reptils are insensible to the Eyes, and much more the Eggs whence they are produced. 5. That a great number of others generate and breed in such places where we cannot come at 'em. 6. That all the Animals with which we are thoroughly acquainted, come from an Egg, and are produc'd by Parents.

If it be therefore an act of Prudence necessarily requisite in the Inquiry after Truth, to judge of things unknown to us by incontestable Axioms, rather than by the drift of our prejudices; 'tis plain that there is no equivocal Generation, since nothing can perswade us of it, besides the ignorance we are in of the manner in which some Animals are generated. On the contrary, there are matters of fact and metaphysical principles, as evident as any mathematical demonstration, that assure us that all Plants come out of Seeds, and all Animals are produced by Parents, and that the most wise and perfect Being never changes the ordinary ways of his Providence, except it be for a miraculous occasion, as the confirmation of saving truth, the deliverance of the just, and the punishment of the wicked, &c. Now 'tis clear that Equivocal Generation, if such a thing was, would be a miracle, because contrary to the known and common Laws of Nature: And therefore the abettors of this way of production ought to prove, that such frequent miracles are necessary in the order of Providence; otherwise all the instances they bring forth of the sudden and wonderful formation of Animals signify no more, than that we know not how it happens.

However we are not so quite destitute of solutions as our Adversaries imagin. For as to the Worms above mentioned, I say they were Eggs of Flies, which these Insects had lain in some tender place of the Lips or Face of those Persons, or which being mix'd with the meat, remained intricate amongst their Gums, or in some

July, 1693.

229

some hollowness of their Tongue, and there bred as they use to do in the dead bodies of Animals.

The room I have left does not allow me to enlarge upon this Subject; and therefore I shall only add an instance to confirm my conjecture. A *Dutch Woman* had her Leg swollen and glandulous about a span from the Knee; the Surgeon, who had her in cure, to know the cause of her disease, took of this glandulous body to the bigness of a nail, washed it with Brandy, cut it, and perceived therein a great many little Worms; whereupon having consulted Mr. *Leeuwenhoeck*, he answered they were come from the Eggs, a Fly had lain in the mortified part: which conjecture of his he proved in the following manner.

He put these Worms in a Box, with a piece of raw Beef, that was soon consumed by them as well as the glandulous body, wherein they were born. He fed them three several times, and five days after, viz. July 31, 1687, he found his Box empty, but having look'd carefully over all the Room, he recovered some of these Worms that would eat no more, and were already grown to the length of ones Nail. He put them upon a paper covered with a large glass, and the following day in the morning, he observed one of these Worms shortned in length, but encreased a third part in bulk, so that it had something of the shape of a Tun. On the Evening, he perceived four others in the same posture, that from white began to grow red. August 11 the Cods of these Worms were all black; he open'd one of them, whence he took out a perfect Fly, that was yet wet and motionless. He observed that besides the Cod, this Insect was wrapt up in a very thin Membrane. He opened this untimely Fly, and found a great quantity of Eggs in its body.

August 15, all the Flies inclosed in the Glass were hatched, and at the same time he perceived other Flies against the Glass Windows of his Chamber, that he supposed to have come from those Worms, that he had not retrieved. On the 28 he opened three of these Flies, whence he got oblong Eggs, 25 times bigger than those he had taken out of the untimely Fly. In feeding these Insects, the most part died, or fled away; so that September 7, he had but two left, that were probably Male and Female, for they laid 145 eggs. Some of which he caused to be hatched, in less than 24 hours, by carrying them in his Pocket, shut up in a Box.

It's observable that Nature's wise Author has given such a propension to those Creatures, that cannot bring up their progeny, as that they lay their Eggs in proper places to breed them. Thus Flies most commonly lay theirs in dead bodies, pustules, ulcers, or wounds,

wounds, because in those tender parts their Eggs may sit easily, and find warmth, humidity and food.

Perhaps you will say, that it's not likely a man should swallow as many Eggs of Flies or other Insects, as there are oft found Worms in his Body. To this I answer, that tho there be no Worms generated, where no Eggs of Insects ever were, and tho all Insects come out of Worms, and perhaps Fowls and other Animals too; yet it follows not, that all Worms should become Insects: For, want of air, room and other conveniencies may hinder the transformation, and cause them to persist and breed in the state of Worms. But I am forc'd to defer the explication and confirmation of these conjectures till another time, and so to break off, after having begg'd the continuance of your Friendship, and assured you of the real esteem I shall ever have for your parts and merit.

July, 29.

F I N I S.

The CONTENTS.

Letter XXV. <i>Against Deism, occasioned by the late pretended Oracles of Reason</i>	197
Letter XXVI. <i>A Demonstration of the Infinite Divisibility of Matter.</i>	208
Letter XXVII. <i>Exceptions against that Demonstration.</i>	211
Letter XXVIII. <i>An Answer to those Exceptions, with some Objections against the Corpuscularian Philosophy</i>	215
Letter XXIX. <i>The former Exceptions, and the Corpuscularian Philosophy vindicated</i>	218
Letter XXX. <i>An Account of Worms breeding in, and taken out of the Face, Gums and Tongue of several Persons; with some Remarks on equivocal Generation.</i>	222

ERRATA in June.

Page 184 line 27. for perused read used. p. 191 l. 39 for broader r. broad.

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Algebra according to the late Improvements; Geometry, and all the usual parts of the Mathematics, together with the Arithmetic of Infinities, Converging Series, and Conic Sections, are carefully taught at the Mathematical School, in Adams Court in Broadstreet, near the Royal Exchange, London: where Youth are Boarded. Gentlemen may be taught abroad, and those at distance in the Country, may be taught by Letters, by R. Sault, Math. Profess.

Those that will do the favor to the Author of these Memoirs, to write or send any Papers to him, are desired to direct 'em to his Lodgings, At Mr. Fage's, a Turner, in Play-house Yard, near the Thistle and Crown, in Blackfriars.

F I N I S.

MEMOIRS

FOR THE

INGENIOUS

CONTAINING

Several Curious Observations in *Philosophy*,
Mathematicks, *Physick*, *History*, *Philology*, and
other Arts and Sciences.

IN

Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

AUGUST, 1693.

To be continued Monthly.

VOL. I.

*Foculare tibi videtur, & quidem bené,
Dum nihil habemus majus, calamo ludimus:
Sed diligenter intuerere has nanias,
Quantam subillis utilitatem reperies.*

Phædr. Prol. lib. 4.

LONDON, Printed for W. Rhodes at the Star, the Corner of
Bride lane in Fleet street. And for J. Harris at the Harrow in
the Poultry. 1693.

Where are to be had the Memoirs for *January*, *February*, *March*,
April, *May*, *June*, and *July*.

Memoirs for the Ingenious.

AUGUST, 1693.

LETTER XXXI.

To the Reverend Mr. *Erasmus Warren*,
Rector of *Worlington*, in *Suffolk*.

ARGUMENT.

Occasion and Motives of this Letter. Difficulties published against the first Chapters of Genesis. A Philosophical Paraphrase of the first Chapter, to explain the Works of the six Days Creation. That the Style of Moses is more sublime than any Paraphrase can be. That God created all the Celestial Orbs, before the Earth became a Chaos. The Sense of the Word Bara. Whether the Hexameron of Moses comprehends the Creation and Disposition of the whole Universe, or of the Terraqueous Globe only? The Chaos and the Incubation of the H. Ghost upon it known to the Heathen Philosophers. Whether God gave to the Chaos a motion 48 times swifter than its daily Rotation, and how long that Motion continued? Whether the Air and the Sea were made or dispos'd in the same Day? Whether the subsiding and circulation of the Waters may have been performed within three Days? What were the Works of the fourth Day, if the Planets and Stars were already created? The Phrase of two great Lights justified.

Reverend Sir,

AT last your learned Adversary has yielded the Victory to you; for he has now publickly own'd, that *Moses* and his Hypothesis are irreconcilable, and therefore endeavour'd in his *Archæologia* to turn that sacred History, the most antient in the World, into a groundless account accommodated to the prejudices of the Vulgar, which consequently is not to be rely'd upon, either as to the time, or to the order and manner of the Creation. And yet he has not stopp'd there, but past as severe a Censure upon the second and third, as upon the first Chapter of *Genesis*; and God knows whether he will not at last make bold with the rest of the sacred Writings. For, what assurance have we, that if he came to imagin some other Hypothesis, to which the Prophetical Books, the Gospels and Epistles were as contrary, as is the first Book of *Moses* to his *Theoria Sacra*, he would not raise as many difficulties against 'em, as he has done against that? He is too knowing not to be sensible of this; that a man of mean parts can start more objections in one day, than perhaps the ablest Divines, Critics and Philosophers can solve in many years; and therefore I cannot imagin he should have raised these, meerly on purpose to shew his acuteness, but rather believe he has been hurried away with a fondness for his System, and expos'd his thoughts to the public view, without being aware of the ill consequences that may be drawn from them.

Dr. *Burnet* has a great Character in the World, and his Works do sufficiently testify his Learning; which makes me wonder the more at the strength of prejudices, and pity the fate of that great man, that he should be so much in love with a Romance of his own, as to betray, into the hands of its Adversaries, that H. Religion, by which he hopes to be saved, and which he is so much concerned to defend as a Christian, a Divine, and a Servant to the greatest of all Protestant Kings.

As long as his Book remained in the Tongue of the Learned, I thought it not pertinent to make any Animadversions upon it, tho several Friends, and even Persons of great Quality, press'd me hard to it. It were, I said, an unnecessary trouble; you had answered all his objections so well to the purpose, and I should gain no great credit by the defeat of a vanquish'd Enemy: Yet to satisfy them in some manner, I published a short Hypothesis to shew the possibility of rendring a probable reason of *Moses's* account concerning the formation and drowning of the Earth. But the face of things is now altogether

altogether chang'd; for having been perswaded to confute from time to time some heads of a late Atheistical Book, printed under the Title of the *Oracles of Reason*, I was told, I could not handsomely excuse myself any longer from making some remarks, at least upon VII and VIII Chapters of the *Archæologia*, which the Publishers have plac'd at the very beginning of their impious Collections, without his consent I suppose. However in the uncertainty I am, whether you, Sir, that have been successful in confuting the former Books of Dr. Burnet, have not already undertaken to answer the latter; I shall confine myself to a positive Method, that is, to clear *Moses's* account from the absurdities which are charged upon it, to turn it into a Parable or a popular Tale, by shewing that there is nothing but what agrees with sound Reason, when rightly understood.

The Heads which the Publishers presume to criticize are, 1. The *Hexameron*, or Six-days-creation. 2. The Creation of the Woman in particular. 3. The Situation of the Terrestrial Paradise. 4. The two miraculous Trees, viz. that of *Life*, and that of the *Knowledge of Good and Evil*. 5. The Temptation of our first Parents.

The design of these *Memoirs* does not now allow me to give at once a full explication of all these Heads, wherefore I shall here only insist upon the first: And that it may come into the compass of one of these Letters, I shall begin with a paraphrase of the first Chapter of *Genesis*, and especially of those Verses which the Atheists endeavour to find fault with, and then justify the sense I put upon them by some Remarks.

'I. 1. In the beginning, God created that almost infinite number
'of Orbs, which we use to call *Heavens*, and amongst 'em the Orb
'of the *Earth*.

'2. I shall not here describe the shape and properties of each of
'those Orbs. It was enough, it seems, God should reveal to us
'he is the Author of their Being; for the rest, we are so little con-
'cern'd in them, that he thought it unnecessary to enter into parti-
'culars on this subject: and therefore I shall only insist on the forma-
'tion of the Terraqueous Globe. Before God gave it its present
'disposition, it was but a confus'd heap of particles of different
'nature, blended together without any order or form. It had then
'been in vain to produce any Creatures in it, since it was not possi-
'ble to keep them alive, by the laws of motion. God design'd to
'establish, this Globe being covered all over with a liquid and dark
'matter, that swallowed up and smothered the vivifying Rays of
'the Sun; so that if there were an interior and more solid Crust, they
'could not penetrate into it. And therefore the Spirit of God dif-
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‘ fused himself thro all the parts of this liquid Mass, separated them
 ‘ from each other, and gave them such figures and properties, as that
 ‘ at the first command of God’s Word, or of the *Messiah* united
 ‘ with his infinite wisdom, they were apt to disintangle and put
 ‘ themselves into that beautiful order, that now makes the harmony
 ‘ and magnificence of this world.

‘ 3. After these preparations, the first thing, God’s Word or his
 ‘ *Messiah* did, was to give a circulary motion to this Globe, by
 ‘ which the heaviest particles began to subside, and the lightest to
 ‘ rise; then began the surface of this confus’d congeries to clear up,
 ‘ and the Rays of the Sun to pierce through it; so that a man that had
 ‘ been upon that part that was oppos’d to the Sun would have seen a
 ‘ sort of light, not much unlike to that of our Crepuscle or Twilight.

‘ 4, 5. This Secretion was finished within the space of a natural
 ‘ day and night, or of 24 hours; and God, seeing how exactly the
 ‘ *Messiah* followed the Ideas of his infinite Wisdom, approved of his
 ‘ performance, and resolved to change nothing in it.

‘ II. 6, 7, 8. Next to the Secretion of the lightest corpuscles that
 ‘ rose up into the *Æther*, and of the heaviest that subsided down-
 ‘ wards to compose the Earth, came the separation of the rest of
 ‘ the watery Mass. The rotation of the Globe still continuing, the
 ‘ *Æthereal* globules were followed by others more ponderous, tho
 ‘ lighter than the watery particles that remained next to the surface
 ‘ of the Earth. Add to this, that besides this circular motion, the
 ‘ light and heat of the Celestial Orbs help’d the rising of these Va-
 ‘ pors. Then it had been a pleasant and wonderful sight to observe
 ‘ the aerial Water of the Clouds suspended at the top of the Atmo-
 ‘ sphere, and the bottom of the *Æther*; and this Atmosphere mak-
 ‘ ing a separation betwixt the lightest and heaviest, the highest and
 ‘ lowest waters, as tho it had been a flower or firmament, *שמים* :
 ‘ for which reason this extended and transparent substance has gotten
 ‘ in the *Hebrew* Tongue the name of *Heaven*.

‘ 9, 10. Whilst the aerial water was rising to the top of the At-
 ‘ mosphere, the terrestrial, or common, did not stay motionless;
 ‘ for as the *Terraqueous* Globe is higher at the Equator than at the
 ‘ the Poles, and its rotation did still continue; it was necessary ac-
 ‘ cording to the Laws of motion and gravity, God had instituted at
 ‘ the first disposition of things, that the waters should subside to-
 ‘ wards the sides of the Earth, and leave the dry land to appear, near
 ‘ the Equator. Neither was it requisite God should depress those
 ‘ sides, to make a bed for the Ocean; since the waters tending to the
 ‘ Center by their own heaviness, and not being able to penetrate
 into

' into it, because of the opposition of the earthly Mass must need
 ' subside towards the sides of the Globe that are nearer the Center
 ' than the extremities of the Equator. All that the waters could do,
 ' was to carry along with them some particles of the earthly super-
 ' ficies, that made the least resistance, and thus prepare and dig the
 ' channels of Rivers; or to creep into the bowels of the Earth,
 ' through the subterraneous conduits left in it, by the irregular de-
 ' pression of its particles; without however being suffer'd to pierce
 ' as far as the center; because Matter lyes the closer and more com-
 ' pact together, the nearer it is to the center: So that the subterra-
 ' neous waters were continually forced up towards the superficies of
 ' the Globe, by the perpetual resistance of the Earthly particles.
 ' And thus were performed in 24 hours the separation of the exha-
 ' led and running Waters by the Atmosphere, and that admirable
 ' circulation of the Sea and Rivers, so necessary for the ensuing fer-
 ' tility of the Earth: Wherefore also God approv'd of the works
 ' of the second day, as he had done of those of the first.

' III. In the mean while, the Sun, Moon and Stars had not yet
 ' appear'd, the Clouds suspended at the top of the Atmosphere in-
 ' tercepting the greatest part of the light; which God seems to
 ' have done on purpose, lest the future Inhabitants of this World,
 ' to whom the Angels were to reveal the mystery of the Creation,
 ' should ascribe to the influence of the Sun or Stars what was the
 ' immediate operation of Gods Spirit and of his infinite Wisdom,
 ' viz. the fashioning some particles of Matter into the seeds of an
 ' almost infinite number of different kinds of Herbs, Plants and Trees.
 ' A sort of Creatures so copious in their productions, so wonderful
 ' in their make, that no finite power or understanding could endue
 ' Matter with those qualities, tho since the first delineation of Plants
 ' in their Seeds, natural Agents have been able to perpetuate 'em.
 ' Those Seeds seem to have been prepar'd, or configurated, on or
 ' before the first day of the *Hexameron*, when the *Spirit of God mov'd*
 ' *upon the face of the Waters*; and they were made fruitful or exerted
 ' their virtues within 24 hours, at the command of the *Messiah*,
 ' whose works of the third day God approv'd as he had done those
 ' of the former.

' IV. 14-19. Now began the Sun and Stars to appear, the violent
 ' motion that had been given to the Terraqueous Globe, in order to se-
 ' parate the Bodies of different Nature, as the *Æther*, the *Air*, the *Water*
 ' and the *Earth*, and put each of them in their proper places; their
 ' motion, I say, abated, and was chang'd into a diurnal rotation,
 ' to mark the difference between day and night, and an annual mo-
 ' tion

tion about the Sun, that measured the year, and distinguish'd the four seasons, whilst the course of the Moon made up the months. Thus the time was exactly divided; and two great Lamps kindled in the Heavens to enlighten Mankind day and night. God therefore approv'd the works of the fourth day.

V. 20-23. The Sky being wholly clear'd up, and the Terraqueous Globe made a fit habitation for living Creatures, God's Son fill'd it with 'em, beginning, according to his usual method, by the formation of the more imperfect, as Fishes and Fowls. Here is observable the blessing he poured upon them, by virtue of which the males and females of Animals will continue to bring forth others of the same kind, delineated in their Seeds and Eggs.

VI. 24-32. Now follow the Inhabitants of the Earth, Reptils and four-footed Beasts; and at last Man and Woman: Wherein is farther observable, 1. That Reptils are said to have been *made after their kind*; to shew that they come from Parents as well as other Beasts, and are not produc'd by different degrees of heat and moisture, or any other *equivocal* cause. 2. That as to Man, the *Messiah* not only form'd him out of the *Dust of the Ground*, Gen. II. 7. or out of those seeds, which the *Spirit of God* had prepar'd whilst he mov'd upon the face of the waters, but created him besides in his own image and likeness, breathing into his nostrils the breath of life, or putting into that beautiful Machine a Spirit, or thinking being, to animate and direct it.

Thus you see, Reverend Sir, that *Moses* may be made to speak as an *English* Philosopher, without ridiculing him. But it will be said, Why then did he not use such a style? I answer, because it would have had nothing but humane and mean, whereas he was to write as an Author divinely inspir'd, and raise the spirits of his Readers by the sublimity of his thoughts: In this he has succeeded to admiration in the judgment of the best Rhetors of Antiquity, and even of Heathens; for which *Dionysius Longinus*, one of the most esteem'd and famous amongst 'em, does highly commend him (a),

(a) Longinus: *ταύτην καὶ ὁ Ἰουδαίων νομοθέτης, ἔχων ὁ τύχων ἀνὴρ, ἐπειδὴ τὸ θεῶν δυνάμει καὶ τὴν ἀξίαν ἐγνώκει, κατέφηνεν, ἐνδοῦς ἐν τῇ εἰσβολῇ, γρηφας τοῦ νόμου, εἰπὲν ὁ Θεὸς, φησὶ, τί; ἤρξατο φῶς, καὶ ἐγένετο.* Thus also the Lawgiver of the Jews, who was not a vulgar man, having conceiv'd a worthy Idea of the power of God, express'd it accordingly; for being to write his Laws, he tells you at the very entrance, and God said, What? let there be light, and it was so.

The style of *Moses* is then so far from being Plebeian, that it is the highest strain of thoughts, to which a mortal can attain; and we could

could not but be fully perswaded of it, did we understand the Energy of the *Hebrew* Tongue, since we can yet discover so many beauties in our imperfect Translations. I shall not farther enlarge upon a truth, which I cannot make sensible to such as are taken up with prejudices against it. And therefore I proceed to make some observations, in order to clear my Paraphrase.

§ 1. I seem to advance a great novelty, when I explain the word *Heavens* by the Celestial Orbs, and *Earth* by the Terraqueous Globe. But let's see whether there is any other more proper sense?

1. Shall we understand by them the first Matter of *Aristotle* and *Descartes*? But there is no instance of the like expression in the H. Writ.

2. *Heavens* signifie sometimes the habitation of the blessed Spirits; but if that word has not here a larger sense, how comes the Earth to be joyn'd with it, and all the intermediate spaces to be forgotten?

3. Neither is it probable that the transparent Matter of the *Heavens* should have been created without the luminous part; for besides that there is no Phrase in the Holy Writ, where *Heavens*

signify no more, this supposition does not well agree with the known laws of motion, which perswade us that such transparent spaces

must either be void, or replenished only with *Æthereal* and *Aerial* particles, proceeding from the vapours or exhalations of more solid Bodies.

4. Shall we have recourse to the Allegorical Interpretation mentioned in the XI. Letter of these *Memoirs*, p. 70? But I fear this explication would not be relish'd by the most part of Divines and Critics;

add to this, that no physical Argumentation may be drawn from an Allegory. 5. It might be said that God in the beginning created all the celestial Orbs, but that they were all a confus'd *Congeries*

as well as our Earth, that was created at the same time. But is it an Idea worthy of the most perfect Being to conceive that he created a Chaos? Can any inordinate and imperfect thing come

out of his hand? Or does he want to go on by degrees, as finite powers and intelligences use to do? Besides, how comes it that the

ordering of the terraqueous Mass requir'd at least five days, and that so many Thousand of heavenly Globes, in comparison of which this

our habitation is but one point, were all finished in one day, viz. the fourth? 6. To turn this Verse into an unnecessary preamble, by translating *antequam Deus crearet*, before God created; besides that,

it's contrary to the present punctuation of the original words, and the usual phraseology of the *Hebrew* Tongue (See Letter. xi. p. 69.) 'tis to ascribe to *Moses* a Tautology, unbecoming his Wisdom in such a compact Abridgment. 7. It remains then only to say, that in the

beginning, that is, when God gave a being to the creatures, he created

all

all the Orbs, and that our Globe was one of them ; that is, he produced then the Whole Universe, with all the substances that are in it, which the Holy Writ uses to signify by the words *Heavens* and *Earth*, tho it may be these substances have since undergone a great many changes, which we are not concern'd to know.

It cannot be proved that *ברא*, *Bara*, which we interpret *create*, strictly signifies to produce Beings that were not before ; but there is no word in the *Hebrew* Tongue, that comes so near that signification: for it always relates to some wonderful or prodigious production. Thus *Numbers* xvi. 30. *Moses* foretelling the destruction of *Korah*, *Dathan* and *Abiram*, says, *If the Lord make a new thing, and the Earth open her month, and swallow them up, &c.* which the *Hebrew* expresses thus, *If the Lord create a Creation, ברא בריאה*, *Bero beriah*, *Psal.* Li. 10. *David* prays to God to create in him a clean heart. *Esa.* xliii. 7. and lxxv. 18. The Reformation of the World by the propagation of the Gospel is called a *Creation*: And *Moses* in this Chapter uses the word *Create*, but in the first Verse, and when he speaks of Animals, of which, I believe, it may be to some degree demonstrated, that they were not produced by the ordinary laws of motion. And since 'tis evident, that neither Matter, nor any finite Spirit can be eternal, it follows, that *Bara* signifies here to produce Beings that were not before. But whether the Angels, or the Heavens, their habitation, were first created, or whether they were produced at the same time, I shall not undertake to determine, the reasons alledged for the pre-existence of Spirits in the XI Lettet of these *Memoirs*, having not the necessary evidence to convince me, and having not discovered any other since that time.

It will be objected, that the Creation should no longer be an *Hexameron* or six days work, the words in the *Beginning* signifying then an indeterminate time in which the Celestial Orbs and the Earthly mass were created ; which seems contrary to *Gen.* ii. 1, 2. *Exod.* xx. 11. and xxxi. 17. *Deut.* v. 14. *Hebr.* iv. 4. To this I answer, 1. That God can have, and most probably has created all the matter of the world, and even all intellectual and corporeal substances, in a moment: *He spake and it was done, he commanded and it stood fast*, *Psal.* xxxiii. 9. for nothing can resist his omnipotent Will. 2. That it was as easie to him to finish the Heavens in the very moment of their Creation, as to give them the form of luminous Globes by a subsequent motion; and this seems to have been the opinion of *S. Austin*, who was as great a Philosopher as he is esteemed a famous Divine

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But here rises a new difficulty: If the Heavens were perfected at the time of their Creation, how came the Earth to remain a Chaos, an *Embryo*, (a) a confused *Congeries*? Or if the Heavens were not finished as soon as created, why did the ordering of such an inconsiderable part of the World, as the Terraqueous Globe, require five days time, when the disposition of so many Celestial Orbs was compleated in one day? I know not what to answer to this objection, unless it were. 1. That *Moses* did not intend to give us a particular Description of the formation of the Heavens, or of the other Worlds, as the Modern Philosophers stile them, it being sufficient to know that God is their Creator, as well as of this our Habitation. 2. That therefore the Phrase *In the beginning*, does not denote a determinate time, and that 'tis possible, that the Creation of the Celestial Orbs have preceeded the present formation of the Earth, by many Thousand Years. 3. That some time before that Formation, the Earth, that was perhaps one of the luminous Globes, or some habitable World, became *Tohn va bohn*, a disorder'd and inordinate Mass, by some cause unknown to us. 4. That what ever we can guess of the Original of this confusion is, that the sins of its Inhabitants were the chief cause of it, as those of their Successors did draw the Flood upon them, and as ours are like to be the Incendiaries of this present Earth. For the Ideas of a most perfect Being, and of a Chaos are so opposite, that the latter cannot be conceiv'd to proceed immediately from the former. 5. That therefore the H. Ghost, who is represented to us as the Destroyer of Sin, the Renewer and Sanctifier of the World, apply'd himself to repara the Disorders, which Sin had caused in the former Globe, and to make that disorder'd Mass fit for a new and beautiful disposition, wherein Justice and Truth should reign again. 6. That the *Messiah* hypostatically united with the Son of God, the second person of the ever Blessed Trinity, having promised his Father to satisfy for the Trespases of those Intelligences, wherewith he design'd to replenish the future world, and with the assistance of the H. Ghost to sanctifie them again, got leave of his Eternal Father to finish the ordering of the Chaos, which he performed in six days, following in all the Idea's of the Infinite Wisdom, continually present to him by reason of their Hypostatical Union. 7. These Hypotheses are not contrary to the passages before quoted: For in the style of the H. Writ it may be said of the Terrestrial Orb, *that the Heavens and the Earth were finished, and all the host of them in six days, and that on the seventh day God ended his work, which he had made.* Gen. II. 1, 2. 1. Because the Air and Æther are commonly call'd *Heavens*, and 'tis even ob-

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(a) See Lett.
xi. p 74.

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serv'd that this is their proper name, *Gen.* 1. 8. 2. I know not of any passage where Plants and Animals are call'd the *host of the Earth*, but if such a phrase be admitted, Birds and Meteors may as well be nam'd the *host of the Air or Heavens*, as when *Virgil* says,

Corvorum increpuit densis exercitus alis.

Geor. 1.

Tho after all I had rather translate with the Septuagint ⲙⲁⲓⲁⲓⲛⲁⲓ *their ornament*, because the א in *Tsebhaam* may be a Vowel, and the word derived from צב *Tsebbi*, and not from צבא *Tsabha*. Add to this the Verb עשה *Gnasah*, he made, is not synonymous with ברא *Bara*, created, that signifies to produce something new; nor with יצר *Fatsar*, to give it a new form; but that the proper sense of *Gnasah* is to dispose and adorn; and therefore it has an immediate relation to the ordering of the Chaos in six days: See *Isa.* xliii. 7. where these three Verbs are made use of. As to the other passages, that seem to insinuate the creation of the whole Universe in six days, they are but transcripts of, or allusion to this of *Genesis*.

§ 2. The Tradition of the Chaos had been preserv'd amongst the Heathens, tho so far corrupted, that they believ'd it extended through the whole Universe.

Unus erat toto Natura vultus in orbe

Quem dixere Chaos, rudis indigestaque moles.

Ovid:

But our Divine Writer, better informed than they were, teaches us that it was only the Earthly Globe that was an inform and confused Mass. See *Lett.* XI. p. 74. They also retain'd some knowledge of the H. Ghost's incubation on the Chaos, still extending it to all the Worlds. *Aeneid.* vi. 719.

Principio cœlum & terras, camposque liquentes,

Lucentemque Globum Luna, Titaniaque Astra,

Spiritus intus alit, totamque infusa per artus

Mens agitat molem, & magno se corpore miscet:

Inde hominum, pecudumque genus, vitæque volantum,

Et quæ marmoreo fert monstra sub aquore pontus.

Here I cannot but observe that the Heathen Philosophers were more reasonable than such Christians, who pretend that Animals can be produc'd by blind chance or equivocal causes. The Poet teaches the same Doctrin, *Georg.* iv. 220.

§ 3. The

§. 3. The most perfect Being only can create or produce things that had no existence before, but things being created, he may enable a finite Spirit united with his Infinite Wisdom, such as the Messiah is, to give a new form to some disorder'd things as the Chaos was, and to dispose them according to the Idea's of the Infinite Wisdom. This is not a bare conjecture, but a very ancient Tradition, the Key of the Divine Providence, of the Redemption of Mankind, and of all the Mysteries of the Christian Religion. But the proofs of this Truth would require a Dissertation much longer than this Letter ought to be, and therefore I propose it here as a bare supposition, which being granted would illustrate my Paraphrase, tho its being deny'd does not make it inconsistent.

§. 4, 5. In the XXI Letter of these Memoirs, I have advanc'd a conjecture, on which I would not then lay any stress, lest I should contradict the Sacred Writ, viz. That to disentangle the different parts of the confused Globe, God gave it a motion 48 times swifter than its daily Rotation, so that it turn'd about its own Center twice in an hour. It's indeed said that *God divided the light from the darkness*; That he call'd the light day and the darkness night, and that *the evening and the morning were the first day*, according to our English Translation. But observe, 1. That the last phrase in the original is express'd thus, וְהָיָה עֶבֶר וְהָיָה בֹקֶר יוֹם אֶחָד, *Vaihi Gnebher vaihi bhoker jom echad*, that is, *and there was evening, and there was morning, one day*: and likewise v. 8. *and there was evening and there was morning, a second day*. It's plain, that without putting any force upon the Text, these words may be taken in this sense, *That the works whereof this phrase makes commonly the close were performed in one day, or in the space of 24 hours*. As to that other expression, *That God divided the light from the darkness*, it must signifie no more than this, *That after the rising and separation of the Æthereal corpuscles, the Sun emitting his rays through that rarefy'd Mass, produc'd on the opposite surface of the Terraqueous Globe a weak light, not much unlike to that of our Crepuscle*. For this, my reasons are, 1. That whether we keep to the vulgar opinion that the Sun and Stars were not created till the fourth day; or we say that they did not appear because of the thickness of the Air, and then of the Clouds, that are call'd the *superior Waters*; however it be, it is evident that the light of the three first days could not be so strong as that of the following. 2. If we conceive that from the very first day, the day and night were exactly divided, there will be an unbecoming repetition, and even a contradiction between the 4th and 5th verses, and the 14th and 18th: for 'tis said in the last that God constituted *lights* or *lamps* in the firma-

ment, להבדיל; *Lehabhdil*, to divide or make a separation between day and night, §. 14. למשל; *Limshol*, ad regendum, to rule over the day and over the night, and to divide the light from the darkness, v. 18.

The use of this supposition is very great, especially if you admit the possibility of subterraneous fires or at least explosions, since it is by fire and motion that all the resolutions and separations of material compounds are perform'd. The possibility of subterraneous explosions cannot be deny'd, since the bowels of the Earth contain so many different bodies, apt to kindle, rarefie and emit fumes and vapours by their sudden commixtion. If it be said that the Watery and Earthly particles lay then so close by one another, that tho the violent motion given to the Terraqueous Globe might cause the corpuscles of different Minerals to meet; yet they could not kindle and make explosions; their collision being weakned or hindred by the aqueous globules: To this I answer, 1. That we know but very little of the inward constitution of the Chaos: for tho *Moses* says that the Earth was *Tohu va Bohu*; yet this does not prove that the confusion reach'd to the very center of the Globe: on the contrary; he seems to confine it to the parts about the superficies, when he adds, that *darkness was upon the face of the deep*, and that *the Spirit of God mov'd on the face of the waters*. 2. It's most probable that the incubation of the H. Ghost did not only produce and fit the Seeds or Vital Spirits of Plants and Animals, but withal so disentangle the parts of other bodies, that they wanted but a competent degree of motion to take each their proper place; and this motion they acquir'd by the extraordinary rotation of the Globe, follow'd by subterraneous explosions.

§. 7, 8, 9, 10. I have compriz'd under the works of the second day, the disposition of the Atmosphere, and the gathering of the Waters into the Ocean. 1. Because they seem to me perform'd at the same time, that is, that whilst the vapours and the aerial corpuscles rose up, the remaining Waters ran down from the Equator to the Poles round about the Globe. 2. To shew that this double distinction of the liquid Matter was finish'd in one and the same day, the Sacred Historian has divided the two phrases, by which he uses to close the works of each day, putting the one, *viz. and there was evening*, &c. at the end of the 8th verse, and the other, *viz. the approbation of God* at the end of the 10th.

However, if any one will defer the entire gathering of the Waters till the third day, I have nothing against it. But what I desire that it may be observed is, that my Hypothesis will then remove all difficulties concerning the subsiding and circulation of the Waters.

You

You may read in the II. *Letter* of these *Memoirs*, that before the Flood there was but one Sea, *viz.* the Main Ocean, that surrounded the Terrestrial Globe from one Pole to another; and that the Equinoctial Diameter is longer by about 17 Miles than the polary Axis. Thence follows, that as long as the Earth shall turn upon its present Poles, the Waters will never overflow it, tho they be perhaps in an equal quantity with the Land, because they must then ascend 8 Miles and an half above their level, which they cannot do by reason of the pressure of the Atmosphere. And therefore I conceive that during the Chaos, when *the Spirit of God moved upon the face of the Waters*, that consequently covered the Terrestrial Globe, the Poles of the Equinoctial were the Poles of the Terraqueous Mass; but when he thought fit to give it a new form, he set it upright and made it turn upon its present Poles. By this very situation, the Waters would have subsided, but to promote the secretion of the Air and Vapours, and to make short work with the rest, so that it should bud and shoot up on the third day, and on the fifth it might be a fit habitation for living Creatures; for these reasons, I say, and perhaps many others unknown to me, he gave an extraordinary motion to the terraqueous Globe that made it turn twice in an hour, or 48 times in a natural day, about its own Center.

This supposition leaves little or no difficulty at all in the subsiding and circulation of the Waters. For the circumference of the Terraqueous Globe is computed at Three hundred and sixty degrees or 17 Thousand two hundred and eighty *English* miles, of which the half comes to 8640 miles. A River of ordinary swiftness may be esteem'd to run over a space of ground 40 miles in length, within 24 hours, which is but a very modest computation; for I have advanced my self 20 *German* miles, that is above 60 *English* miles, in a Boat upon the *Rhine*, with two Water-men, that took no other trouble but to direct the Vessel. And therefore supposing that the extraordinary rotation of the Earth gave the subsiding Waters a motion 48 times swifter than that which they now have, it follows that at the end of the third day they had run over a space of 5760 *English* miles in length, and so left free and dry two thirds of the semi circumference on each side of the Equinoctial Axis. But because this little World is as full as ever it can hold, the subsiding Waters being press'd by the Atmosphere, were forc'd to run as far, that is, 5760 *English* miles, into the subterraneous Channels; so that Fountains and Rivers may have sprung out as soon as the Waters were congregated into the main Ocean.

§ 14-19. If it be ask'd, whether the Sun, the Planets and the Stars were perfected before the formation or ordering of the Terrestrial Globe? I answer, that most probably they were so, except perhaps the Moon, that is very near us, and seems to have a great dependance upon our Orb. I am perswaded of this, 1. Because 'tis said of the *Earth* only, that it *was without form and void*. 2. Because the works of the fourth day would then have been of such a vast extent, as to keep no proportion with those that were perform'd on the other days. 3. Because considering that proportion, the farther clearing of the Sky, the fixation of the motion of the Earth to a Diurnal rotation, and an annual motion about the Sun, together with the daily and monthly course of the Moon, seem a sufficient task for this day. None must expect other reasons from me, for these are Criticisms that cannot be demonstrated to the Eye.

I shall only add an observation to justify *Moses* of his being too popular in this Philosophical History of the Creation. *God*, says he, *made*, or rather *dispos'd* and *constituted two great lights, the greatest light to rule the day, the least light to rule the night and the Stars*, v. 16. How can this be, say our Would-be-wits? Is it not evident by Astronomical observations, that the Moon is the smallest of all the Planets? Yes, but is it not as plain that the Sun and Moon are two great Lights in reference to us; that they seem made on purpose to distinguish betwixt day and night, to divide the months, the seasons of the years, and to give light to mankind each on his turn, as *Propertius* expresses it, *Lib. II. Eleg. 18.*

Aspice uti cœlo modo Sol, modo Luna, ministrat.

How could then *Moses* speak more properly, if he only design'd to explain the formation of this Globe? For if these two Celestial Torches are made for other ends besides these, and w^hal to promote the fecundity of the Earth, to help on the flowing and ebbing of the Sea, and the like; or if they serve to the uses of other creatures besides the Inhabitants of the Earth, that is altogether unknown to us. Pray observe by the by, that there is not a word of the creation or formation of the Stars, as our *English* Translation would insinuate by these words, *he made the Stars also*. By what Grammatical construction those Interpreters supply the Verb *הוּא* *Gnasah*, *made* or *dispos'd*; or for what reason the others include these words, *the greater light to rule the day, and the lesser light to rule the night*, within a Parenthesis, I cannot imagine; unless it be to fa-

vour the common prejudices. But the Original says no more than this, *And God made two great lights ——— the least light לממשלה* הלילה ואת הכוכבים, *Lememsheleth hallailah veath hacochochabhim*, that is, *to rule the night and the Stars*. It seems indeed strange that *Moses* has not mention'd the formation of the Stars, as well as the creation of the Angels; but 'tis only to those who look on his account as a description of the Original of the whole Universe.

I must needs defer my Remarks on the formation of Animals, but especially of Man, to another time, this Letter is already so very long. I grant I have propos'd many novelties in this short Essay, if all may be call'd new that is contrary to the receiv'd opinions. But I appeal to the conscience of every learned Reader, and even of *Dr. Burnet* himself, whether my method is not better than to turn that Sacred History into an Apologue, and *Moses* into a shrewd Politician, that had no respect to truth, but drew up a Romantick account accommodated to the prejudices of the vulgar, in order to captivate 'em and to perswade 'em to observe his Laws, and especially that of the Sabbath. I am no superstitious admirer of Antiquity, but I could hardly refrain shewing my indignation against a man who should deal so scurvily, and on so little grounds, with *Thucydides* or *Livy*, as *Dr. Burnet* or his Translators have done with the most ancient and sacred Historian in the World. Methinks I see *Moses* with a Crown of Glory on his head, in the midst of all the Patriarchs, Prophets and Apostles, of all the Holy Jews and Christians, and follow'd from far by the wisest Heathens; I see and hear him redarguing the base impiety of the Modern Atheists, with these or the like Majestic expressions:

Res est Sacra, Miser, noli mea tangere Fata:

Sacrilega bustis abstinere manus.

August 9.

LET.

 LETTER XXXII.

To Mr. William Pate.

ARGUMENT.

The Nature of the Signs, which God uses to give to confirm his Promises, and the Certainty of future Events. The Rainbow compared with the Christian Sacraments, with the Curse laid upon the Serpent and Women, with the smiting of Arrows by K. Joash. To what comes God's Promise in setting up the Rainbow, according to the vulgar opinion That Dr. Burnet's System cannot solve those Difficulties. An attempt to remove them by the Hypothesis proposed in the 2d, 21st and 31st Letter of these Memoirs. That there were no thick Clouds nor tempestuous Rains before the Flood, and therefore the Rainbow could not appear. How the ground was watered and made fruitful? What afforded Vapours to the Atmosphere? That the Deluge was altogether miraculous, or produced by extraordinary Causes. Why God made choice of that Punishment?

S I R,

YOU have impos'd a very hard Task upon me to explain the grounds of that famous Covenant, God vouchsafed to establish with the second Father of Mankind, to assure him and his posterity, that he would never drown the Earth again. *I do set my Bow in the Clouds, said the Almighty, and it shall be for a token of a Covenant between me and the Earth, &c. Gen. ix. 9-17.* The words of the Original are as plain as can be, and Interpreters do not disagree in their translations. But the difficulty consists herein, that this is perhaps
the

the only occasion in which God, to strengthen the faith of men, and remove all manner of doubt, as to the certainty of his promises, should have made choice of a token or earnest, that had nothing new or prodigious in it: whereas in lesser occasions he never fail'd of granting or giving wonderful signs for the security of his word. Such were the successive moisture and dryness of *Gideon's Fleece*, *Judg. vi. 37 40.* The Angel ascending in the Flame of *Manoah's* burnt-offering, *Judg. xiii. 20.* The shadow going ten degrees backwards in the Sun-dial of *Ahaz*, to assure *Hezekiah* of the lengthening of his Life, *Isa. xxxviii. 8.* *Zacharia's* dumbness, *Luk. i. 10, 20.*

On the other side, the Rain-bow seems to be a natural Meteor, and as ancient as the World, and therefore all the Divines that I know of, except *Dr. Burnet*, compare this setting of the Bow in the Clouds to the institution of the Christian Sacraments, whose symbols Water, Bread and Wine, are common things, that have no immediate operation upon the Soul, and yet are imploy'd to signify to the faithful their spiritual cleansing, nourishment and increase. But against this it may be urg'd, that the Sacraments are not only a pledge of Gods promises to us, but also outward signs of our profession of Christianity, and therefore their Elements must consist in things easie to be had. And as to their efficacy, since they have none but upon well dispos'd minds, it may be ascrib'd to a peculiar operation of the H. Ghost, of which these sacred Ceremonies are but occasional causes.

By this, Sir, you see how vastly different the Christian Sacraments and the Rain-bow are, since the latter was a token of Gods promise, independing on the disposition of men, and extended even to inanimate things, to the whole terraqueous Globe; God giving it to *Noah*, whom he had restor'd to the dominion of it, as a security, that he would never more deface it by an universal flood.

To alledge the Serpents curse, that it *should go upon its Belly*, and the subjection of women to their husbands, together with their labour in bringing forth Children, is to explain a dark notion by a darker. For we know not whether Serpents had not another shape before *Adam's* sin; and the affirmative may be justly inferr'd from this very passage, supposing God created but one pair of breeders of every kind, especially of such animals as might be noxious to men. And as to the subjection and labour of Women, they are things altogether inconsistent with the state of innocence, for under a just God no innocent can suffer, as common sense teaches us, and *S. Austin* rightly argues. There had been indeed a precedency betwixt

both Sexes (as most probably there is even amongst Angels and blessed Spirits) conformably to the order of their Creation, as *S. Paul* insinuates, *1 Tim. ii. 13.* but no forc'd subjection, and much less such painful labour as women big with child must undergo, chiefly because of the weakness of their body, as may be prov'd by many experiments and physical Reasons.

(a) *2 Kings*
xiii. 14-19.

The smiting of Arrows upon the ground by *Joash* King of *Israel*, at the command of the Prophet *Elisha* (a), comes nearer to the purpose; for the shooting of an arrow cannot signify a victory, unless it be by Gods appointment. But after all here is still something new and extraordinary, viz. that very shooting, as perform'd by a King, so many times, and by the order of a man divinely inspir'd. Let's now suppose that the Rain-bow was no new Phenomenon, but had often been seen by *Noah* and his Sons; then the most proper and significant sense that may be put upon these words, *I establish my Covenant with you — I set my Bow in the Cloud, &c.* is this, *As surely as you now see this variously coloured Bow, so certainly do I promise you, and your posterity, that I shall never drown the Earth again; and you may remember this promise of mine, as oft as you shall perceive this beautiful Meteor.* This had been sufficient for *Noah* and his Sons, to whom the revelation was made. But if after their death, some of their Issue being frighted with the fear of a new Deluge, had ask'd his Grand-father, one of *Noah's* Grand-children, what assurance he had that the Earth should be no more overflown? he would doubtless have answered, that God had promised it to *Noah*, and given the Rainbow for the security of his word. The next thing, this suspicious Person would apparently have asked, would have been, whether this Meteor began then to appear? To which the old Patriarch replying negatively, would not much have confirmed the wavering faith of his doubtful Querist. For as this sort of men are apt to imagine the worst, he might have fancied with the impious of our age, that this was but a political invention of *Noah*, to encourage his posterity to the repairing and manuring of the defaced Earth.

As you see, Sir, I deal very fairly with the Objectors against the common opinion, and you may be apt to think that I propose difficulties, out of which I shall not be able to extricate my self. For I am not allow'd to build another world, with a central fire in the middle, cover'd with an interior crust, over which was extended a deep and large abyss of Water, and over this again a fat and porous crust, without Mountains and without a Sea, nay, as smooth as a ball of polish'd Marble: And having thus feign'd an imaginary Terra-

Terraqueous Globe, give it the figure of an Egg, turning (tho against the rules of motion) every day upon its longer Axis, and every year about the Sun along the Equinoctial line; so that the Torrid Zone should be continually burnt with a parching heat, and both the Temperate enjoy a perpetual Spring, with an equality of days and nights.

— *Nobis non licet esse tam disertis
Qui musas colimus severiores.*

The respect I have for the Holy Writ engages me to follow *Moses's* account; and lest I should take my own Fancies for the real constitution of the Earth, to stick close to the observations of Geographers and Mathematicians, which assure me, that this Globe is almost perfectly round, and only about 17 Miles higher at the Equator than at the Poles; so that it turns not upon its longer, but upon its shorter Axis; and that the Ecliptic cuts the Equator but twice in a year, and removes so far from it towards the Tropics, as to make with it at two other times, an Angle of 23. degrees, 30 minutes. An account altogether opposite to that of the so much fam'd *Theoria Sacra Telluris*.

However I am sure God has made a World infinitely more suitable with the explication of the Phenomena than any other a mortal can imagin, and 'tis only our ignorance that suggests to us, so many incongruities in it. Let's then try whether allowing only such changes in the primitive constitution of the Earth, as diseases and old age use to make in men, such alterations as the universal Flood, and subsequent Inundations and Earthquakes may naturally have produced, we should not be able to explain the new appearance of the Rainbow.

I have prov'd in the II, XXI and XXXI Letter of these *Memoirs*, that, according to the late observations made with the *Pendulums*, the Terraqueous Globe being higher at the Equator than at the Poles, the Waters of the Chaos must needs have subsided towards that part of its circumference that was nearest to the Center, and surrounded it from one Pole to another. Thence follow, First, That not the Torrid Zone, but the Poles were uninhabitable, unless it were by Whales, Sea Monsters, and other Fishes. Secondly, That the Earth being not then divided into four great Continents, nor cut by a Mediterranean Sea and several great Lakes, as it is now; and the Sun never removing from the Equator farther than to the Tropics, it did not look perpendicularly on the Main Ocean, unless it be East and West, whilst it passed from 160 degrees of longitude

to 210. For I allow, methinks, a sufficient extension to the Ocean, when I suppose it to have covered the third part of the Globe, reaching besides the forementioned longitude, from 60 to 90 degrees Northern and Southern latitude. However, if any would needs grant a whole half of the Globe to the Sea, I shall not dispute against him, for that will rather strengthen than weaken my Hypothesis. Thirdly, Since the Sun darts its beams but obliquely upon the Ocean, it follows, that it could not then draw as many and as thick Vapours as it now does, that the *Pacific*, the *Southern*, the *Atlantic*, the *Mediterranean* and the *Indian Seas*, besides several great Lakes lay directly under it. Fourthly, Vapours are nothing else but rarefy'd Water, that is drawn or forced up by the agitation of the Sun, just as the Dust of the ground by Winds, Carts, Horses, Men, &c. Fifthly, Nothing can reflect nor refract the Rays of the Sun, unless it be a Body whose parts are so contiguous as to repel the beams of light, or at least to obstruct their passage, and remove them from the right line they had a tendency to describe. Sixthly, The Sun continually draws Vapours from the Waters, or moist Bodies, whereupon it darts its Rays. Seventhly, However these Vapours do not always condense into Clouds, either because they are not in sufficient quantity, or because the same action of the Sun that has rais'd them up, keeps them so dispersed, that not only the minutest corpuscles of light can pass through them, but even such abundance of Rays, as make clear the Sky, and the Sun's body sensible. Eighthly, That a Cloud may represent the colours of the Rainbow, 'tis requisite that its particles be as fluid and as contiguous as the globules of common Water, and that the Rays they reflect, make with the Sun and the Eye of the Spectator an Angle of 42 degrees.

This being suppos'd, I say, that from the first or second year after the formation of the Earth, when it had been sufficiently dry'd, till the time of the Deluge, the Rainbow never appear'd, nor could appear, at least by natural causes; which I prove thus. If the Sun did not then draw a competent number of vapours to be congregated into clouds, whose particles might fall as thick and contiguous as are the drops of common Water, the Rainbow, that proceeds from the contiguity of the cloudy particles melting and reflecting the rays of the Sun, could not appear. But 'tis evident that the Sun did not then draw a sufficient number of vapours to be condensed into thick clouds, if you grant my Hypothesis of the Earth not being cut into several Continents and Islands, but being all of a piece, and surrounded with the Ocean: for then the Sun look'd but obliquely upon the Waters. And 'tis known that the Sun draws

draws not as many vapours from the Land as from the Sea; nor in Winter as in Summer time; and that there is a perpetual Winter under the Poles.

But if it did not rain on the primitive Earth, how could it be fruitful? Sir, *Moses* the best of all Philosophers will tell you: When after a short recapitulation of the formation and growth of Plants, he adds; *The Lord God had not caus'd it to rain upon the Earth, and there was not a man to till the ground; moreover there went up a mist (a dew) from the Earth, and water'd the whole face of the ground.* I confess that the History of the Antediluvian times is very short, but for this reason the truer it is, and the more attentively it ought to be read. Had *Moses* design'd to put upon us a Romance or a Parable, the share he has had in affairs testifies him to have been a man of more ingenuity than that which is requisite to invent plots and stories taking with the vulgar. But he was a man of that veracity that he would write nothing but what stood upon record, as the Genealogies of the first Patriarchs; or what was conveyed to him by a constant and undoubted Tradition, as the formation of the Earth, the situation of the Terrestrial Paradise, the fall of Man, the quarrel of the two first Brothers, the history of the Flood. And therefore we ought to be extreamly wary in asserting any thing of those early Ages, which is not mention'd by that sacred Author. And since he is so far from speaking of rain, that he expressly denies that *God had sent any upon the Earth*, those that pretend that he did it, ought to bring forth at least physical demonstrations, to make their assertion good.

However, that our Faith might be rational, *Moses* has been so careful as to prevent the objection of our pretenders to Philosophy, by shewing us what means preserv'd the fecundity of the soyl, *וַעֲלָה עָנָן וַיִּשְׁקֹף וַיִּרְדּוּ מָטָר וַיִּשְׁקֹף* *Vead jagnaleh, and there went up a mist, or a dew, &c.* Now I ask any impartial Critick and Philosopher, 1. Whether the word *ad, vapour*, set in opposition to *מָטָר Matar, thick rain*, the same which God uses when he threatens to drown the Earth, *Gen. vii. 4.* does not signifie that it did not rain violently before the flood? 2. Whether a dew falling abundantly and constantly two or three hours every morning, would not be sufficient to make the ground fruitful?

Neither of these postulates can, methinks, be deny'd; yet to give them a greater evidence, I observe that the Rain-bow appears but very seldom, because several conditions are requisite to produce in us the sensation of its various colours. The first shall be, if you please, that the melting Cloud must be in such opposition to the

Sun,

Sun, as that the rays it reflects make an angle of 42 degrees with the eyes of the spectator. However this is not to be understood, as tho the Rain-bow were only to be seen from an indivisible point, as certain Pictures, which appear quite different, when their situation is chang'd. For the Sun and the reflecting Cloud are two such vast bodies in reference to us, that this Angle takes up a very great extent, and accordingly the Rain-bow is seen from several places, and by different persons at the same time. Add to this, that the Sun shines very oft whilst it rains, without any appearance of a Rain-bow, which shews that other conditions are requisite in the melting Cloud, besides its situation in relation to the Sun and to us. And therefore, since neither the situation nor the fluidity of the Cloud will do alone, its thickness must be a third necessary condition, that is, the parts of the melting and reflecting Cloud must be as contiguous as those of our common Water, in which we may so easily paint the colours of the Rainbow, by opposing a glass of Water to the Sun.

We live in a very Cloudy Country; and yet I am sure that in the foggiest weather, the parts of the mist are never, or at least very seldom, as contiguous as those of common Water; for were it otherwise, we could not go about our lawful occasions, the Mist would so wet us, and hinder our sight. This, Sir, I know by the instance of Divers, who unanimously testify that they can hardly distinguish very sensible objects, under 20 fathoms of Water, unless the Sky be very clear; the rays of light have undergone so many reflections and refractions before they come to them.

The conditions necessary to the production of the Rain-bow meeting so seldom together, and its own appearance being so very rare; we ought, methinks, to believe that God intended something uncommon when he said, *I set my Bow in the Cloud*, when he gave that Meteor for a security of his promise, for the sanction of such a solemn Covenant, as that which he then made with the Earth, and all its present and future Inhabitants, never to drown them again. And since there are no physical reasons to prove that the Rain and Clouds were as thick and contiguous before the Deluge, as most probably they were at that time, and have often been afterwards: Since, on the contrary we have prov'd that the Terraqueous Globe had then another disposition, the Sea encompassing it, and a dew watering the ground, instead of the tempestuous rains that now often spoyl its product: I have reason to conclude that in all likelihood the first appearance of the Rain-bow was at the beginning of the flood. Whether it was seen or no during the first or second year

year after the Creation, when the soyl being yet very moist, afforded plenty of vapours, I will not stiffly determine, tho the testimony of *Moses*, that *a dew went up from the Earth, and water'd the whole face of the ground*, inclines me to the negative.

It will be objected, that at long run the Earth must have been exhausted, the Sea lying at too great a distance to supply the Atmosphere with new vapours, viz. beyond 60 degrees Northern and Southern Latitude, and betwixt 150 and 210 Longitude. To this I answer, 1. That there were as many Rivers as there are now, and perhaps more, because many Fountains might spring in those places that are now taken up by Seas and large Lakes. 2. That vapours were drawn from the extremities of the Ocean North and South, which dilated and spread themselves through the rarefy'd Air during the day, but condens'd during the night, and fell in a dew towards the morning. 3. That 'tis not likely the Earth was inhabited so near the Poles and the Sea as 59 degrees of Latitude: But that tho it had been, their longest day being there of 18 hours, the night or the absence of the Sun was even then long enough to give time to the vapours to condense and fall into dew. 4. That part of the Ocean, which lay betwixt 150 and 210 degrees of Longitude, afforded yet a greater plenty of vapours, than the Sea about the Poles, especially amongst and near the Tropicks, where it lay more expos'd to the action of the Sun; and those vapours were continually driven towards the Land, where the air was more heated and rarefy'd by the reverberation of the Earth. 5. A soft and continu'd dew waters the ground better, and does not spend near so many vapours as a tempestuous and unconstant rain.

I never thought on the first appearance of the Rain-bow, before you propos'd that question to me, which, as I now perceive, is of greater consequence than is commonly believ'd. I am not a little satisfy'd that my solutions do so naturally flow from that Hypothesis, by which I have explain'd the formation and drowning of the Earth, the subsiding and circulation of the Waters. All this may perhaps tempt you and other Learned Philosophers to believe that there is something more in it than a bare conjecture. But as knowledge is unprofitable without vertue, and is at the best but one half of our happiness, I design to ingage pious men in its behalf; for those notions that promote piety, ought to be as favourably entertain'd, as the opposite are to be detested.

The Deluge was not brought forth by the parching heat of the Sun, or any other necessary cause, as Dr. *Burnet* pretends, with as little foundation as prudence: But by the will of God, or of the *Messiah* the

Governour of this world, to punish the wickedness of Mankind. It was in their power to have prevented that fatal and universal blow by their repentance: and therefore God let 'em be forewarn'd by *Noah*, a preacher of righteousness, 2 Pet. ii. 5. a hundred and twenty years before, Gen. vi. 3. and tho they remain'd still unconvertible, yet they could not exhaust the merciful patience of God, *Hebr. xi. 7.* and 1 Pet. iii. 20. But even when they had forc'd him to use the utmost rigour, he made choice of a lingering punishment; that might open their eyes in this last extremity, and save at least their Souls, if their bodies were condemned to dye. They saw the Earth open its mouth in several places, and vomit fire and smoak; they felt it tremble and totter, a thing altogether unusual in that untainted soyl. Instead of that pleasant shower, which dropp'd every morning upon the ground, they saw a thick and tempestuous rain falling as torrents day and night, whilst terrifying Meteors appear'd in the Air, the Rivers overflow'd, and the very Sea broke in upon the Land. This, Sir, was not perform'd in one day, for the Rain lasted forty days and forty nights together, and proportionably the other concomitant causes of that wonderful execution. And therefore sinners had a sufficient time to repent, or at least to remember the threatnings of *Noah*.

I know not whether the Rain-bow appear'd at that time: for how beautiful soever it seems now to us, because of the promise annexed to it; yet in that perturbation of Nature, that Meteor might well be as frightening as Serpents and Leopards are now. The Clouds were thick enough, and the Sun might well shine by intervals, especially at the beginning; if so be, the choice of the Rain-bow for the confirmation of Gods promise, would be the more significant; for it had been as tho God had said, That variously colour'd Bow, which you never saw before I send the Deluge upon the Earth, and which frighted mankind so mightily, the first time it appear'd, will now be a sign to you that there shall never be an universal flood; because the constitution of your Globe is so much chang'd, that rain and fair weather are to succeed one another by turns, without ever prevailing so far upon each other, as that the Waters should overflow all the Earth a second time.

August 14th.

L E T

 LETTER XXXIII.

To the Author of these *Memoirs*, by
Mr. Mark Lewis.

ARGUMENT.

*An Account of Sarah Hastings's Relations, of an uncommon Fly,
and the surprizing Effects of its Biting.*

S I R,

Finding in all your *Memoirs* you do desire correspondence, I thought it my duty, for your encouragement in a Work, which I make no question will in time be of great use, to send you these two Notes.

Some of *Sarah Hastings's* Relations are now at *Stamford*: I think her Daughter goes on in the same way, and doth much good.

There are also two more, one at *Leicester*, the other at *Nottingham*, that are famous Artists in getting out the Worms you mention.

Now I must send you an account of a Fly, exactly resembling a Gnat, only as an *English* Horse differs from a Barb, this Fly is stronger made.

This Fly all *June* and *July* was extream troublesom to most, especially such whose concerns are in the Fields, but more still towards the Fens. I have lived more than 40 years, and have inquired of the aged and learned that are about me, and can't hear they ever observed in any former year the like. I had it from a worthy and learned Doctor, that towards *Wisbick*, he was sent for to some, who were forced to keep their bed by reason of them; but I'll only tell you what I myself found.

June 15th, 1693. Riding two Miles about 6 of the Clock without Boots, I found myself bit, as we call it, on the leg by a Gnat, as I thought, for I killed two of them. That night my Rest was

O o

good,

good, next morning my Legs were red as scarlet where bit for 3 or 4 Inches, swell'd strangely more than Hen Eggs, and each place had a most intolerable itching. I was attacked in four places, so I resolved to use different methods; the first I clawed to the making it bleed, the second I put Fasting Spittle on, the third I supply'd with Oil, the fourth I let quite alone; it was four days before any came down; that I oil'd was first well, the spittled one next, but the claw'd one last of all.

I was amazed at the thing, feared I was under some ill habit of body, till on inquiry, I found it was an Epidemical Distemper about us, this year, so as most took notice of it.

Whether other Countries were troubled with such Insects, how they came, or how long they lasted I am not certain; but know I had one *July* the 17th, for with Oil of Olives I cured it. I would gladly know how People fared in other parts.

Benyfield, *August* 16th.

LETTER XXXIV.

To the Author of these *Memoirs*, by
Mr. A. Bowyer,

ARGUMENT.

H. Lamy's Solution of a difficult Problem in Arithmetical Progressions prov'd faulty.

Reverend Sir,

AS I was perusing Father *Lamy's* Elements of Mathematics, I have met with a difficulty which you will do me a great kindness to resolve, it is in the seventh Book where he treats of the *Analysis*, Chap. 7. Page 395. Where you will find the following Problem.

P R O B L E M.

In an Arithmetical Peogression the first Term being given, with the difference of the Progression and the Sum of all its Terms, to find the number of Terms, and the value of the last Term,

Let (saith he) 1 be the first Term of an Arithmetical Progression, and 6 the difference of the Progression. Z is the last Term, and X the number of Terms; The Sum of all the Progression is 40 .

Now by the fourth Proposition of the second Section of the 3^d Book. $X6 - 6 \times 1 = Z$, and by the eleventh Prop. *ibid.* the Sum of the last Term Z with 1 , which is the first, multiplied by the half of X is equal to 40 , Sum of the Progression, or to the Double, viz. 80 multiplied by X . And so $XZ \times X1, = 80$; and $Z \times 1 = \frac{80}{X}$. And again $X6 - 6 \times 1 = \frac{80}{X} - 1$; Then $X6 - 6 \times$

$2 = \frac{8}{X}$; Then $X6 - 4X = \frac{80}{X}$, Then $XX6 = 80 \times X4$. Dividing the whole by 6 , the Quotient is $XX = 13\frac{2}{3} \times \frac{1}{3}$ of $X4$. Now since XX is the Square of the number of in Terms in this Progression, it is plain that the square number, which is the nearest above $13\frac{2}{3}$ that is 16 , will be the value of XX , and that $\frac{1}{3}$ will be the complement of $13\frac{2}{3}$ to 16 ; Then X is 4 , which signifies that this Progression has 4 Terms, of which the last being $X6 - 6 \times 1$, which makes 19 ; this number 19 will be the value of the last Term.

$1 \cdot 7 \cdot 13 \cdot 19 \cdot$

Which resolution gives us this general Theorem.

T H E O R E M.

Dividing the Double of the Sum of the Terms of an Arithmetical Progression by its difference, the Root of the nearest square number above the Quotient of this Division will be the number of the Terms of that Progression.

After an exact examination, I find this Theorem to be sometimes true, sometimes false, as you may see in the two following Examples.

First Example.

2. 5. 8. 11. 14. 17. 20. 23.

The first Term is 2, the difference 3, the sum of all the Terms 100, whose double is 200; which being divided by the difference 3, the Quotient is $63\frac{2}{3}$ above which the nearest square number is 64, whose Root is 8, which is the number of Terms; and in this case the Theorem holds true.

Second Example.

2. 4. 6. 8. 10. 12. 14. 16. 18. 20.

The first Term is 2, the difference of the Progression 2, the Sum of all the Terms is 110, its double is 220, which being divided by the difference 2, the quotient is 110, above which the nearest square number is 121, whose square Root is 11, which according to the Theorem should be the number of Terms, but there are but 10 Terms in this Progression, then the Theorem is false, &c.

Now, Sir, seeing this Problem is of a great use, you will do Mathematicians no little service to give them a general Theorem to resolve it.

August 24th.

LET.

LETTER XXXV.

To Mr. A. Bowyer.

ARGUMENT.

Observations on F. Lamy's Theorem, in answer to the foregoing Letter. That it proves always true in Arithmetical Progressions that begin with an Unite, and may still be useful, corrected as 'tis here. Another Canon by Mr. Sault for finding out the number of Terms in those Progressions: Mr. Raphson's Canon. F. Lamy's Character.

S I R,

I Was strangely surprized to find a mistake in such an accurate Author as F. Lamy. At first I would have cast the fault upon the Printer, imagining that instead of these words *La racine du plus proche nombre quarré au dessus du quotient*, the root of the next square number above the quotient, we ought to read, *La racine du nombre quarré le plus proche du quotient*, the root of the square number nearest to the quotient. And accordingly I found that *Theorem* thus read held true in many Arithmetical Progressions I try'd it upon. However I suspected my conjecture, as seeing no other ground for it, but the esteem and affection I have for the Author; so that going on still with other instances, I was altogether undeceived by this progression.

—6, 11, 16, 21, 26, 31, 36.

wherein, as you see, the first number is 6, the difference 5, the total Sum 147, and the double 294, divided by 5 the difference, gives 58 and $\frac{4}{5}$ the root of the next square-number is 8 (a) for $8 \times 8 = 64$ and $7 \times 7 = 49$, but 64 is nearer to 58 and $\frac{4}{5}$ than 49, where- as there are but 7 terms in this progression.

(a) X signifies multiplied into, = equal to, + more, — less, V root.

Next,

Next, I applied myself to discover the cause, that might have induc'd so great a Mathematician into a mistake; and read his demonstration carefully over, but could not find so much as a fault of the Press in it. Only I observed that the progression, upon which he had made his Canon began with an Unite, whence I concluded that his Theorem prov'd true in all the Arithmetical progressions, that begun likewise with an Unity, as you may try it, by adding an Unite for the first number in the last progression, as also in the following instances, $\div 1, 3, 5, 7, 9, 11 = 36$, the double $= 72$, divided by 2 the difference gives $36 = 6 \times 6$ the square root is 6, the number of terms. $\div 1, 7, 13, 19, 25, 31 = 96$, the double $= 192$ divided by 6 the difference gives 32, the root of the next square-number above the quotient is 6, for $6 \times 6 = 36$, and 6 is the number of terms. $\div 1, 9, 17, 25, 33 = 85$, the double 170 divided by 8 the difference gives 21, above which the next square number is 25 for $5 \times 5 = 25$, and the root 5 is the number of the Terms. So that after all, the whole mistake may be cast again upon the Printer, who may have forgotten some words; for the Theorem express'd as follows, proves true, for ought I know. *Dividing the total Sum of an Arithmetical Progression, that begins with an Unite, or that can be reduced to it, by the difference that is betwixt the terms, the root of the next square number above the quotient of that division, will be the number of terms in that progression: or if the progression does not begin with an Unite, the root of the next square number to the quotient of that division, will be the number of terms in that progression.*

However lest it should be said, that this is not a Mathematical Canon, but an uncertain Theorem of very little use; I propos'd your question to my ingenious Friend Mr. Sault, who after several calculations gave me the following Canon, in which T represents the number of terms, Z the sum of all the terms, a the first term, and x the difference that is betwixt them.

$$T = \sqrt[4]{8Zx + 4aa + xx - 4ax} \quad \frac{x - 2a}{2x}$$

I have tried this Canon upon several progressions, in which it proves true, as you may see in the following.

$\div 2, 4, 6, 8, 10$, wherein $T = 5$, $Z = 30$, $x = 2$, $a = 2$. $Z = 30 \times x = 2 = 60$; $60 \times 8 = 480$; $4aa = 16$; $xx = 4$, the product is 500, subtract from it $4ax = 2 \times 8 = 16$, remains 484, divide this last product by $4xx = 16$, the quotient is 30, 25; and the root 5, 5

Subtract

Subtract from this root $\frac{x-2a}{2x} = -5$ remains only 5 the number

of terms. The operation being well made, it presently appears

that this Canon is Geometrical, $\frac{x-2a}{2x}$ being so ordered that they take

off or add what fractions are necessary to compleat the number of

terms. However for a greater certainty, I try'd it upon the two

following instances, 7, 14, 21, 28, 35, wherein $T=5$, $Z=105$,

$x=7$, $a=7$, $8zx=5880$, $4aa=196$, $xx=49$, in all 6125, sub-

tract from this product $4ax=7 \times 28=196$, remains 5929, which

divided by $4xx=196$, the quotient is 30, 25, of which the root

is 5, 5, but $\frac{x-2a}{2x} = -5$, and therefore -5 being subtracted

from 5, 5; it only remains 5 the number of terms.

$\div 2, 10, 18, 26, 34$, $T=5$, $Z=90$, $x=8$, $a 2$, $ZXx=720$, $8Zx=$

5760 , $4aa=16$, $xx=64$, the product of all this $=5840$, which

lessen'd by $4ax$, that is by $2 \times 32=64$ remains, 5776, that divided

by $4xx=256$, the quotient is 22, 5625, and the root 4, $\frac{75}{100}$, to

which adding $\frac{x-2a}{2x} = \frac{25}{100}$ then $4 \frac{75}{100}$ of an Unite with $\frac{25}{100}$ will be

equal to 5 the number of terms.

This made me think that no Canon so simple as that of F. Lamy,

could be brought to a Geometrical exactness, because $\frac{1}{2x}$ or the

root of the double of the total sum divided by the common diffe-

rence of terms can be but very seldom perfectly equal to T or the

number of terms, so that something must be added to that Canon

to make it universal.

Just now the ingenious Mr. Raphson, who has got so great a name

among the learned Mathematicians; by his *Analysis Aequationum*, has

communicated to me a most accurate and geometrical solution of the

propos'd Problem, viz. The first term, the sum of all the terms and

the difference of the terms being given, to find out the number of terms and

the value of the last term, in any Arithmetical Progression. He makes Z

$=$ the sum, $x=$ the difference, $n=$ the number of terms, $b=$ the

first term, and $a=$ the last term. The first thing he looks for is a ,

or the last term, and the Problem falls into this equation $aa+na=$

$2zx \mp bb - xb$. And therefore $a = \sqrt{2zx \mp bb - xb \mp \frac{xx}{4} - \frac{x}{2}}$

The value of the last term being found out, 'tis no hard matter to discover the number of terms, for every one knows that n is $= \frac{2z}{b \mp a}$

I immediately tried this Canon upon the following Progression, 6, 9, 12, 15, 18. $Z=60$, $x=3$, $b=6$, $2zx=360 \mp 36=bb$; subtract from the product 396, $xb=18$, remains 378, add $\frac{1}{4}$ of $xx=9$, that is 2 $\mp \frac{1}{4}$ or $\frac{25}{100}$, The whole amounts to 380,25: Draw the square root out of this number; it is $19 \frac{10}{100}$, or $\frac{191}{10}$: Subtract $x=3$ divided by 2, the quotient is $1 \frac{5}{10}$; which being deducted from $19 \frac{10}{100}$ remains just 18, the value of the last term. Now divide $2z=120$ by $b=6 \mp a=18$, that is 24, the quotient is $5=n$ the number of terms sought.

I am the more oblig'd to these ingenious Friends, that the famous *Prestet* has not mentioned this Problem in his *Elements des Mathematiques*; and that in the *English* Edition of *Oughtred's Key of Mathematics*, there are two faults of the Press in the XI and XII Propositions of his *Arithmetical Progressions*, (which contain the solution of this Problem) that are not easy to be corrected; so that without Mr. *Sault's* and Mr. *Raphson's* assistance, I had been forced to let your curiosity go unsatisfy'd at this present.

But it's high time I should make an end of this Month and Letter; however I must add some few lines concerning F. *Lamy*, *viz.* That this mistake (which appears not to me so considerable, as the smallest spot in a beautiful face) does not at all diminish the esteem I have for the Author, who not only excels in Mathematics, Critics, History, Philosophy and Divinity; but what is infinitely more valuable, is an excellent good Christian, that bestows his pains, not upon hugging the Spirit of Controversy, but upon the Promotion of Learning and Vertue, and the Suppression of Vice. And would to God the most part of Divines in all Communion were like to this Author in Knowledge and Moderation; for then we might expect to see our differences reconciled, to the glory of our Lord, and the spreading of his Gospel through the whole world.

Aug. 31st.

F I N I S.

The CONTENTS.

Letter XXXI. <i>A Philosophical paraphrasis and commentary on the first Chapter of Genesis.</i>	231
Lett. XXXII. <i>Whether the Rainbow appear'd before the Deluge.</i>	232
Lett. XXXIII. <i>An account of a strange sort of Flyes.</i>	255
Lett. XXXIV. <i>A mistake in one of F. Lamy's Theorems.</i>	256
Lett. XXXV. <i>The mistake corrected, and another Canon propos'd.</i>	259

ADVERTISEMENT.

OF all the faults of the Press that have crept into these *Memoirs* none has been so sensible to me as one that is in the last month, p. 199. l. 26. where instead of *the happy constitution of this Realm*, the Printer, or Corrector have put *the unhappy constitution of this Realm*. I may justly charge it upon them, since there is neither blot, nor reference, nor any thing else in my copy, that may have given occasion to this mistake, as any one may see at Mr. Rhodes's one of the Booksellers of these *Memoirs*, in whose hands I have left it. This I thought fit to advise the reader of, to stop the mouth of some people, who fail not to catch hold of the least probability, that they may make others as odious to their Country-men, as they are themselves. The other faults I have observed in perusing the last month are, p. 201. l. 29. *Joh.* for *Josh.* p. 218. l. 4. *consciously* for *maliciously*. p. 222. l. 19. *have been of Worms* for *have been Worms*.

Since by the Letters I have received this month, I see there are ingenious men, who will honour me with their correspondence, I promise them 1st, that I shall not put them to unnecessary charges, with private Letters, unless it were to inquire for some particular circumstance in the relation or question they have sent to me. 2d That I shall answer them publickly as soon as I can, but I intreat them to consider the want of Books, of sufficient knowledge and conviction, or some other urging occasion, may oblige me to defer my answer. 3. I desire to be excused from receiving, answering, or publishing any relation, whose Authors will not be known or stand by it.

Gentlemen may continue to direct their Letters to my Lodgings at Mr. Fage's a Turner, in Playhouse yard, near the Thistle and Crown, in Blackfriars,

F I N I S.

ADAM'S REVENUE

MEMOIRS

FOR THE

INGENIOUS

CONTAINING

Several Curious Observations in *Philosophy, Mathematicks, Physick, History, Philology, and other Arts and Sciences.*

IN

Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

SEPTEMBER, 1693.

To be continued Monthly.

VOL. I.

Χρόνῳ τε καὶ πόνῳ τ' ἀληθὲς ἐκλαμπεῖ, ἀγαθὸν παρὰ τοῦ χρόνου βοηθῶν.

Truth breaks out by time and industry, provided it meet with a good help.

Clemens Alexandrinus, l. i. Stromat.

LONDON, Printed for W. Rhodes at the Star, the Corner of Bride-lane in Fleet-street. And for J. Harris at the Harrow in the Poultry. 1693.

Where are to be had the Memoirs for *January, February, March, April, May, June, July and August.*

MEMOIRS

INGENIOUS

Miscellaneous Letters.

quinto 62 comitato di 12

Memoirs for the Ingenious.

SEPTEMBER, 1693.

LETTER XXXVI.

To the Honour'd Sir *Theodore de Vaux*,
Physician in Ordinary to the late
King *Charles II.* and to *Katherine*
Queen Dowager, Fellow of the Roy-
al Society, &c.

ARGUMENT.

A Commendation of my Lord Duke of Norfolk. Description of the Volatil Salts of the Stones taken out of a Man's Bladder or Loins; Of the fix'd Salts; What effect they produce upon the Blood; Of the Oil. Those Salts have no conformity with common Salt. Proportion of the Stone, with its Caput Mortuum. Description of the Stone it self. Of the formation of Stones in the ground. Men cannot altogether be cur'd of the Stone without being cut. Why the Stone cannot be dissolv'd in the Body of Men? How to try such a Menstruum? The Egyptians way of extracting the Stone. Remarkable Histories. An Infallible way of knowing whether one has the Stone or not. Of the Causes of the Stone, and by the by of the Gout; That both proceed from a petrifying ferment.

How to assure our selves of it, and to come to a more distinct knowledge of that ferment? A strange Phenomenon.

Honour'd Sir,

THough you had not bestow'd a signal favour upon me, by enriching me with yours, and Sir *Theodore de Mayern's* Remarks on several subjects, yet the rank you have still kept both in the Civil and Learned World; would make me glad of being acquainted with you, to have an opportunity to offer you one of my Letters. You was pleas'd to honour me with the first visit, which I can ascribe to no other cause but your usual desire of promoting Learning. This, Sir, is not unknown to me, tho a Foreigner. The Royal Society, and the University of *Oxford*, are yet sensible of the obligation you put upon them, when you perswaded my Lord Duke of *Norfolk* to present the former with his fine Library, and the latter with those curious Marble Inscriptions, that are still round about the Theatre, with the two first Letters of his Grace's Name, *H. H. Henry Howard*, Engraven upon them. And as these Magnificent Gifts will be an everlasting Monument of this Noble Peers Fame, so they will be withal a Pattern for the Friends and Counsellors of the Great, to what things they ought to advise them.

But I supersede, lest I should offend your Modesty, and come now to the observations I have promis'd you upon the Stone in the Loins or Bladder.

As I was perusing some of Mr. *Leeuwenhoek's* Papers which I have by me, I found several sorts of trials that he has made upon such Stones as were taken out of a Man's Bladder when he was cut. 1. He put one of these Stones in a Glass-receiver, and by the strength of Fire extracted out of it the Volatil Salt and Oil. Upon this extract he pour'd clean Rain-water, which presently mix'd with it; then giving time to the Water to evaporate in part, there remain'd an unimaginable number of Salt Particles, all so very little, that many thousands of them would, perhaps, not have amounted to the bulk of an ordinary grain of Sand; so that their various Figures were altogether imperceptible, even with the best Microscope. But by some Particles which had remain'd sticking at the sides of the Vial, he observ'd that many of them were oblong, thick in the middle, and sharp pointed at both ends; others resembled little Parallelograms, and others again had the figure of a *Trapeze*, a *Pentagone*, an *Hexagone*, and *Heptagone*, but they were all as glittering and bright

bright as Chryſtal. He kept that Water ſeveral days in his Cloſet, and perceiv'd that it did not evaporate but with great difficulty.

2. He likewiſe pour'd clean Rain-water on the *Caput Mortuum*, or the remaining parts of the Stone, which lay burnt to pieces at the bottom of the Receiver. Then draining thoſe Aſhes by giving paſſage to the Water, he obſerved in it, after it was partly evaporated, a prodigious number of fix'd Salt Particles, which in many places coagulated together, in the form of the Sun-flower; however ſo as that each of them preserv'd its proper Figure. Other Salt Particles lay unevenly upon one another, and others again ſeparately. Some would grow liquid by a moderate heat, and the heat abating transform again into Salt Particles, but a ſtrong Fire made them harder, and thoſe that were like the Sun-flower were altogether unchangeable.

3. He mix'd of his Blood with the Water drain'd out of the *Caput Mortuum*, and perceiv'd that by this mixture, the Globules of Blood, which give it a red colour, took moſt of them a particular Figure; as tho by a Foreign heat the Natural moiſture had been driven out of them. He alſo mix'd of his Blood with that Water in which the Volatil Salt was melted, whereupon follow'd ſuch a change in the Globules of Blood, as that they were no longer diſtinguiſhable; eſpecially when the quantity of the Water exceeded by much that of the Blood.

4. The Volatil Oil extracted by that diſtillation is yellow, and mix'd with ſo many Salt Particles, that it is not fluid.

5. Both Volatil and fix'd Salt Particles are as bright as Chryſtal, but all ſo very hard, that they do not melt by cold and wet weather; neither have they any conformity with the Particles of common Salt, which, tho never ſo well diſtill'd, preſerve their own original Figures, and are eaſily melted by the moiſture of the Air.

6. Amongſt the Volatil Salt is an Earthy matter, that will not incorporate with Water, nor change its Nature even by Diſtillation.

7. The Stone before the diſtillation is to the remaining Aſhes or *Caput Mortuum*, as 29 to 10; ſo that 19 parts are either conſum'd, or go over to the Volatil Salt and Oil. Water being poured on the ſaid Aſhes, and drain'd out of them, they loſe again two parts; ſo that upon the whole, there remains but 8 parts of 29. The ſame Proportion and Phenomena, our Author has obſerv'd in four or five other Stones, which he has Diſtill'd or Calcinated in the like manner.

8. He took one of these Stones Uncalcinated, broke it with a Hammer, and reduc'd part of it into a fine Powder, whereupon he pour'd clean Water, and made it boil in a Receiver, that some of the Volatil and fix'd Salts might incorporate with it. The Liquor being cold, and the gross matter sunk to the bottom of the Glass, he mix'd of his Blood with the Water that swam at the Superficies, and observ'd no other change in it, but such as common Water uses to make in Blood, viz. to dilute or make it thinner. However, afterwards he perceiv'd in this Water a vast number of Volatil Salts of an incredible smallness.

9. Mr. *Leenwenhoek* has not only observ'd with his Microscopes the Figure of the insensible Salt Particles, whether Volatil or fix'd, but also the shape of the Stones themselves. Even those that appear smoothest are made up of Scales, or little thin Leaves lying upon each other, and are seen through the Magnifying glass as a heap of small Grains of Sand, glittering here and there, by reason of the Salts mix'd amongst them, which also are apparent on the sides, or extremities of these Scales.

These Observations would be as profitable as they are curious, if they could bring us to a right understanding of the Causes and Nature of the Stone. I'll try here what I can do, leaving it to you, Sir, and other Excellent Physicians, to correct and improve my Thoughts.

The hardest Stones, as Marble and Diamonds, are not one solid and continued body, but an aggregate of several Corpuscles to a vast and indefinite number, which the more compact and contiguous they are, or the less Pores they leave amongst them, the harder and heavier is the whole. But what is most admirable of all, is, that hard and heavy Bodies preserve these Qualities even in insensible Particles; for 'tis known, that not only Wood, but the very Marble and Diamonds, have some certain Grains or Veins, that is, a determinate tendency of their Fibres, or of the thin plates they are made of, along which they may easily be split, if the Workman hits happily at them. On the other side, we know not better but that it is the same moisture of the Earth, which entering the Pores of a Seed, swells it up to a Plant, being transformed into the substance of the said Plant; the same moisture, I say, that joining itself to the Principles of a Stone, serves to its increase. This conjecture is as probable as any Physical Hypothesis; for we see in a little spot of Ground a Stone and a Plant growing together, neither have we any reason to doubt whether the drops of Rain that fall upon it be of the same Nature, nor can we presume any diversity of Soil.

Soil in such a little parcel of Earth, considering the small depth to which the Rain penetrates. Add to this, that 'tis not possible to conceive how the various complication of the moist Particles of the Earth, suppos'd to be Homogeneous, can produce bodies of such a different Nature as are Herbs, Plants, Trees, Stones, Metals, Minerals, &c.

This, Sir, is a mournful consideration for some Men, because from thence it plainly follows, that there is a Principle in Stones as well as in Plants and Animals, and generally in all growing bodies, which transmutes into its own substance the adventitious matter; And consequently, that it's as impossible to prevent the formation of the Stone in Mens Bladder or Loins, when there is a disposition, or a principle proper to produce it, as it is to hinder the growth of Weeds and Stones in a Field. The latter however can be performed; for the principles of Weeds and Stones can be exterminated, by often Manuring, over-turning and burning the Earth; but as Humane Bodies cannot be thus roughly dealt with, so I see no means to rid the Diseas'd of that troublesom and painful weight of the Stone, but the dangerous way of suffering themselves to be Cut.

We needed not to come to that woful Operation, if the Stone could be melted away by any inward Physick or outward Medicament; but this method is altogether Impracticable, if I am not mistaken; for it appears by Mr. *Leenwenhoek's* Experiments, 1. That the Stone consists of Volatil Salt Particles, which can indeed be separated, or extracted out of its substance, by the strength of Fire, and then dissolv'd in Water; but they have a propensity to unite again together; whatever be the quantity of the Water they swim in; and when they are coagulated again, neither Fire, Spirit of Wine, nor Campher, can separate them a second time. 2^{dly}. Even amongst the Volatil Salts, there is abundance of an Earthy matter, which neither Fire, nor any *Menstruum* known to us, can dissolve. 3^{dly}. The fix'd Salts are so very rigid, that after they have been extracted out of the *Caput Mortuum* by an infusion of Water, tho the Water be never so much boil'd, Fire it self can alter their Figure but inconsiderably. 4^{thly}. After all Distillations, Calcinations and Infusions whatever, there remains still a *Caput Mortuum*, which is almost a third part in proportion to the whole Stone. 5^{thly}. Of a Stone beaten to a very small Powder, there are but few Particles, in comparison to the whole, that can mix, and be carried away with boil'd Water. 6^{thly}. There are different *Menstruums* adapted to the various Pores and Configuration of Bodies. Thus *Aqua-Regalis* will dissolve Gold and not Silver; and contrariwise, *Aqua-Fortis* will

will dissolve Silver and not Gold; but both will Burn and Scar the Flesh. And therefore I cannot conceive how a *Menstruum* can penetrate so far as the Loins or the Bladder, and there dissolve the Stones, without offending so many tender Conduits, Fibres and Membranes, through which he must pass, or touch at in his way.

However, I have lately heard of a Chymist that pretends to have found out a cold *Menstruum*; by which he can melt the Stone; and I am credibly inform'd, that he has dissolv'd several extracted out of Mens Bodies in presence of Learn'd Physicians. It's added that he keeps his *Menstruum* as a Secret, hoping to bring it to that perfection as that it may be given, and produce the same effect inwardly. I am not acquainted with the Gentleman, but if my Papers come to his hands, I would advise him to try his Skill upon Dogs, which are subject to that Disease as well as Men; for if he can Cure some of these Beasts, he may then the more safely venture upon Mankind.

We ought to be the more cautious, that besides the Reasons and Experiments above-mentioned, to prove that this way of melting the Stone is almost impracticable, it is liable to many deceptions that are of very dangerous consequence. For as long as the Stone lies in its *Mucilaginous* Bed, the pain it causes is not so smarting; but if you drive away this *Mucilage*, or even extract some of the Volatil Salt and Oil out of the Stones, which is all, as I think, that can be produc'd by these pretended *Menstruums*, then the Stone having nothing to rest upon but the tender Fibres of the Loins and Bladder, will be the more ponderous and troublesom. So that, as to those who cannot resolve to be Cut, or are come to that Age that this violent Operation would expose their Lives to an eminent danger, the best method they can take is to avoid all strong Purgatives and Diureticks, as well as all manner of excess, and to keep their Body open by soft Medicines, that may prevent as much as possible the heaping up of gross humours, or their petrification. The famous Sir *Theodore de Mayerne* was of that Opinion, as are also all the Learned Physicians of *France*, and those of *England* too, as far as I can judge.

(a) De Medicina Ægyptior. l. 3. c. 14. Prosper Alpinus^a relates that whilst he was in *Ægypt*, he saw one *Haly* an *Arab* take the Stone out of a *Turkish* Commander call'd *Horam Bey*, in the following manner. He put a Pipe of 8 Fingers in length, and of the bulk of an Inch, in the Canal of the Yard, through which he blew with all his power, squeezing with the other Hand the extremity of the Natural part towards the *Periny*, lest the Wind should enter into the Bladder. Then he stop'd the Mouth of the Pipe,

Pipe, that the *Ureters* might swell up and inlarge. In the mean while his Servant thrusting his Finger through the *Anus*, made the Stone advance by degrees towards the Neck of the Bladder and the beginning of the *Ureters*. This Operator no sooner felt the Stone to be near the *Periny*, but he strongly and readily drew the Pipe out of the Canal of the Yard, extracting together a Stone as big as an Olive-stone. Our Author saw the same operation perform'd, by the same man, upon two *Jews*, viz. A Boy out of whom he took eight little Stones, and a man, out of whom he extracted another as big as an Olive.

Prosper Alpinus was too knowing and sincere, than that we should doubt of the truth of his relation. But I have two things to observe upon this subject. First, That this method is only of use, when the Stone is but small, or when there are many little ones instead of a great. Secondly, That this way is also liable to many deceptions. Sir *Theodore Cranen* testify's, that about the beginning of this age, an *Irish* Woman went through *Scotland*, boasting to have found the Art mentioned by *Alpinus*, for extracting of the Stone without incision. But instead of taking out the true Stone, she extracted counterfeit ones, made of Sand mix'd with *Therebinthin*, Wax, Resine, or some such matter, which she blew through a Pipe into the dilated *Ureters*.

Tho the Stones of men be not for the most part so smooth and hard as Flints; yet had the diseas'd *Scotch* had some more insight in Anatomy, they would not easily have been impos'd upon by this Woman: For such a factitious Stone has little or no resemblance with the true ones. But some men are so fanciful and childish, that as to them deception is a charitable Office. Such was that Gentleman, who would not be perswaded by all the reasons of your learned Godfather, that he had not the Stone. Mr. *de Mayerne*, seeing no arguments could prevail upon him, promis'd at last to cure him; caus'd two Bottles of *Rhenish* to be fetch'd, wherein he put some drops of Spirit of Salt Ammoniac, as a thing of great virtue, and gave him that Wine to drink. Soon after the Gentleman wanted a Chamber-pot, which was brought up, and into which Sir *Theodore de Mayerne* let dexterously a Stone slip. Then, when it was almost full, let's see, said the Doctor, putting his Spectacles most gravely on, whether our Physic has operated? And looking into the Chamber-pot, well, pursued he, the work is done; see, Sir, there is a Stone: The Gentleman staring and amaz'd, own'd himself to be cur'd, and left Sir *Theodore*, (who would accept of no Fees,) with a thousand thanks.

The strength of the imagination is so very great, that it sometimes produces its effect, even upon those that are really sick. The Tooth ach is a very acute pain; however I have often try'd, that being taken up with business of great consequence in my station, the pain would diminish by degrees, and at last entirely vanish, if I did not mind it; but then it returned when I was in bed. And generally we know that in all Diseases, which allow of talking, reading or playing, diversion is one of the best lenitives: And that the imagination exerts its power even over the smarting pains of the Stone, I may convince the Reader by a testimony beyond contradiction, since it is that of his Royal Highness, Prince *George of Denmark*. A *Danish* Lord, who was troubled with the Stone, resolv'd to be cut; but the Chyrurgion, who was none of the most skilful, not finding the Stone, had another ready in his hands, which he shew'd to the Patient: Hereupon the Wound was clos'd up, and this Nobleman was well during three years; at the end of which, the pain began anew more violently than ever; so that he was forc'd to undergo a second operation. But at this time he had the good fortune to meet with an able Chyrurgion, who really took out of his body a Stone of a considerable bigness.

I confess that most of the *Diagnostick* signs of the Stone are equivocal, and that the excrescency of a *Caruncle*, or piece of hardned Flesh in the Bladder, will produce the same symptoms as a real Stone. This was the case of your Neighbour, Captain *Blaggrave* of *Whiton*, whom several Physicians and Chyrurgions perswaded that he had the Stone, whereupon he resolv'd to be cut; but tho the Operator was skilful enough, he could find no Stone at all. There is a certain way to know whether the Patient is troubled with the Stone, or not, *viz.* to introduce ones finger into the *Rectum*, or if the finger be not long enough, a hollow Probe called *Catheter*, must be thrust through the *Ureter* into the Bladder; then you will not fail to meet about the *Pubis*-bone with a hard body resounding as a Stone, if there be really one.

It were time I should say something concerning the causes of the Stone; but here I confess that I am at a loss. I might say as well as another that at the percolation that is made in the Reins, there are particles in the *Serum* too gross, hard and heavy to be carried away with the Urine, so that they fall down by their own weight towards the *Periny*. But this solution is too general to be satisfactory, and is besides liable to several difficulties. 1. Then all men should be subject to the Stone, which is altogether false. 2. If not all, then at least all such whose stomach is weak and the digestion imperfect; but

September, 1693,

271

but this assertion is not more true than the former. For 'tis so far from that all cacochymick bodies should be troubled with that disease, that they are the more secure from it, as well as from the Gout. The Stony and Gouty use to live long, if they know how to manage their health; they are only sick by fits, and at other times are as sound as any other man. There is however an exception to be made as to the Stone: for the violence of the pain, and the frequent reiteration of the fits does often carry the diseased away. 3. The production of the Stone cannot properly be ascribed to any aliments, for it may be formed in all sorts of persons, Noblemen and Peasants, Rich and Poor, Sober and Debauch'd, Children and Women, Young and Aged People. 4. Neither can it be chiefly imputed to the Generation, no more than the Gout, as far as I conceive; for Diseases which chiefly proceed from that Original, come from the untemperateness and corruption of the Blood, from the weakness of all the Parts, from an ill habit and constitution of the whole Body. But we have seen that the Stony and Gouty are healthful enough, and that the interruption of their health is a consequent, and not an antecedent cause of their fits. 5. And therefore I am apt to believe that these two Plagues of mankind proceed both from a Ferment; but that in the Stony it lies in the Loyns or Bladder, where it insensibly dries and petrifies the grossest parts of the Lymph it mixes with; whereas in the Gouty, the Ferment lies in the joynts of the body, and there turns the grossest and most viscous Lymph into a kind of Chalk.

But what is this Ferment? Sir, I would give whatever I am, or ever shall be worth in this world, to know it perfectly; and then I would communicate that secret to the public, as freely as I do any of my thoughts in these *Memoirs*, my love for mankind is so great. But I despair to get it, in the state I now am. I shall perhaps some day or other enlarge a little more upon the Gout, and therefore shall confine this Letter to the Stone. Methinks that it is form'd in humane bodies, almost in the same way as Wood is petrify'd in some certain Springs. To make sure work, water a certain number of Dogs with this and no other water, and from time to time sound them with the Probe: If you find a Stone either in their Loins or Bladder, cut the Animals alive, take out the Stones and the mucilaginous Bed; distil each a part, as also the petrifying water; observe exactly the volatil Salt and Oil, the fix'd Salts, and the *Caput Mortuum*, both of the mucilage and of that water, whether you shall not discover any particles of the same nature with those of any known Mineral? For if we could come so far, the business was half done,

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because knowing the true cause of that Disease, we should be in a way, either to prevent or to cure it. And yet I still doubt of the certainty of this method, because fire may so much alter the figure of those bodies, that they are not any longer knowable. Add to this, that since in every part of the world there are men troubled with that disease; whereas petrifying Springs are only proper to some particular Countries; 'tis not probable that the Stones should be form'd in men, by steams of the same nature with those that petrify Wood in Fountains. There must then be an *Austere* or *Astringent* ferment, such as the Juice of Queuce, squeez'd out of the Aliments, which ferment meeting with a Lymph apt to coagulate, petrifies it by degrees. The Principles of Generation, the Air, a Melancholy and Sedentary Life, and a thousand other accidents, may give such an aptness to the Lymph.

Since Phenomena, the truth of which cannot be doubted, are the most conducive means to a fundamental knowledge of the nature of Diseases, I shall close this Letter with a very surprizing event, that hapned here about *London*, for which *Sir Theodore de Mayerne* is my Author. A Gardener that was troubled with the Stone in the Bladder us'd to put a small Pipe of lead in the canal of his Yard, when he would make water. Once as he was in that situation, some body open'd unawares the door of his Chamber, which put him into such a fright, that the Lead-Pipe slip'd out of his hand, and entred into the Bladder, where it remain'd about two years. At the end of them, the poor man began to feel a great pain towards the Fundament, where rose a swelling, and something that thrust the *Anus*. An incision was made, and the Lead-pipe presently discover'd, which was extracted together with the Stone, in the middle of which it stuck fast. One Mr. *Harris*, that was then Chyrurgion of *S. Bartholomew's* Hospital, brought this Stone and Lead-pipe to *Sir Theodore de Mayerne* to view them. The man was so well within a fortnight, that he work'd in his Garden as before: However the Wound was not clos'd up, for he must make water through the *Anus* all his life.

Septemb. 18th.

L E T.

LETTER XXXVII.

To the Reverend Dr. Hooper, Dean of
Canterbury.

ARGUMENT.

That no plain Answer can be given to a dark and compounded Question. Eight Questions imply'd in that only one, Whether there are Persons possess'd with an Evil Spirit, distinct from their own Souls? That there are Spirits or Substances distinct from Matter, demonstrated from Motion and Gravity. That the first Motor cannot be Matter. Whether the Peripateticks have any distinct notion of their Materia prima. The Incorporeity of God, and an Image of the H. Trinity. That there are good and bad Spirits. That they are of different Orders, and subordinate to each other. That all humane Souls are not alike. That all Spirits were created free. That Blessed and Damned Spirits are now rather spontaneous than free. Of the Liberty of Men. How God, Good and Bad Angels work upon humane Minds? Pretended possess'd are most of them meer Cheats. The necessity of Metaphysical Discussions.

Reverend Sir,

AS you were one of the first, who honoured me with his Friendship in England, so I ought to have given you one of the first places in these Memoirs. And I intreat you to believe, that neither forgetfulness nor ingratitude have made me defer so long what I ought to have paid you as soon as I began to write; but that I am ashamed to be known to men of so great parts, and to have so little to present them with; especially to you, Sir, of whom besides what

(a) William
Lloyd Bp.
of Coventry
and Litch-
field.

I know my self, I have heard one of the most learned and most sincere Prelates of our Church (a) render this Testimony, that *England* might boast to have in you as great a man as any one that is beyond Sea.

It's not only want of knowledge and experience, of Books, Friends, Leisure, and other conveniences, that makes this undertaking a greater task than I can well perform, and would have caus'd me to lay it down, if I were not obliged to continue it; but my greatest discontent is, that what method soever I can take, I cannot please all my Readers. For there are some who desire a *Categorick*, or a plain and short Answer, to all the Questions they propose to me, which in many cases is as much as a plain contradiction. For instance, in reference to the present Constitution of the Commonwealth of Learning, the matter I have now in hand, viz. *Whether there are persons possess'd with an evil Spirit distinct from their own Soul?* depends upon the Solution of several preliminary Questions. As, 1. Whether there are Spirits or Substances distinct from Matter? 2. Whether Spirits separated from all Matter can act upon Matter? 3. Whether those Spirits are good or bad, Friends or Enemies to Mankind, or whether there are of both sorts? 4. Whether there are different Orders of Spirits, and whether they are so far subordinate to each other, as that the power of a Superior Spirit may altogether suspend the operations of an Inferior? 5. Whether it follows, that evil Spirits have such a power, tho it were granted to the good, and how far that power extends? 6. What were the evil Spirits which our Saviour cast out whilst he liv'd upon Earth? 7. Supposing them to be real Substances, whether those malicious Demons have still power to plague Mankind with Possession, Witchcraft, and the like? 8. What are the distinguishing Characters of a true and false Possession?

I. The first Question is demonstrable in the affirmative, viz. *That there are Spirits or Substances distinct from Matter.* If there be Motion in Nature, and Matter cannot move it self, there is a principle of motion distinct from Matter. But that Matter cannot move it self, appears from thence, that all Bodies are ponderous; which I prove thus. Gravity is the property of Bodies, by which they endeavour, as it were, to descend to the Center either of the Earth or of the World: But this endeavour or tendency is an effect either of their Knowledge, or of their natural Inactivity and Immobility. That it's not an effect of their Knowledge is plain, because those compound Bodies that seem to be endued with some sort of Knowledge, as living Creatures, are the most remote from
that

that tendency to the Center; and that as soon as that Principle of Life is gone from them, they lie dead and unmoveable, and would descend to the Center were they not under-propt by other Bodies. And therefore the gravity of bodies, or their tendency to the Center, is an effect of their natural inactivity and immobility, and consequently Matter cannot move it self.

If it be objected, that all bodies are not ponderous, because we may observe some ascending and others descending. I answer, That not one body does really ascend, but that such as appear to do so are only thrust upwards, or hinder'd from descending lower by other compound bodies heavier than they are. For because, according to our Hypothesis and the reality of things, all Matter is ponderous and cannot move it self, it follows, that the more Matter is in compound bodies, the more ponderous and unmoveable they will be; and therefore, that whensoever Matter is moved, such compound bodies as have less Matter in them will give room to the more compact, and so appear to ascend. Conformably to those Arguments, some Ingenious Philosophers of our Age, as *Borelli*, and the late Honourable *Robert Boyle*, have demonstrated, that such bodies, as were esteem'd to be naturally light, are really ponderous. Thus Smoak will descend in the *Torricellian* Tube, or in a Glass-Pipe exhausted of gross Air: Flame and Fire are ponderable several ways, &c.

II. The only remaining Subterfuge is, That tho Matter be unmoveable in it self, yet the Principle of Motion can be Matter, and withal something besides, that is, the first Motor. Nay, the Objectors pretend that it must needs be so, because, say they, they can no more conceive how a pure Spirit, or a Substance altogether separated from Matter, can act upon Matter, than how Man could be the cause of so many motions, if he had not a Material Body. This Objection encroaches upon the 2d Question, which indeed is not so easie to be determined as the first, however I hope to demonstrate the affirmative, *viz.* That there are pure Spirits, and that they can act upon Matter, if I can prove, 1. That there is something Increated. 2. That Matter is Created. For thence evidently follow these three Propositions, 1. That the Increated Being is a pure Spirit. 2. That the Increated Being is the Creator of Matter. 3. And therefore that pure Spirits can act upon Matter.

As to the first, *viz.* That there is something Increated, I prove it thus: We have an Idea of Sovereign Wisdom and Power; for we can conceive a Wisdom so perfect, as that it never mistakes nor can mistake, and a Power so great, as that it can do whatever is fisible.

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And therefore Sovereign Wisdom and Power, or rather the Being whose Attributes they are, is Increased. The Consequence is plain; for if Sovereign Wisdom and Power are not Increased, they must needs proceed, either from Matter, or from a more perfect Being; from Matter they cannot proceed, for we have seen that Matter is unactive and insensible in its own Nature; neither do they issue from a more perfect Being, for they are the Sovereign Wisdom and Power, than which nothing can be conceiv'd more perfect.

As to the second, That Matter is Created, I prove it thus: Whatever has a Principle of its motion distinct from it self, has a Principle of its Existence; but Matter has a Principle of its motion distinct from it self, because, as it hath been already prov'd, Matter cannot move it self; and therefore Matter has a Principle of its Existence. That which has no Principle of its existence is eternal, exists of its self, or has produc'd it self; but that which has a Principle of its motion distinct from it self, does not exist of it self, since it does not depend on it self as to its Manner of Being; neither can it have produc'd it self, or brought it self into Being, since it cannot bring it self into Action, and therefore Matter having a Principle of its motion distinct from it self, has also a Principle of its Existence, and consequently is Created.

Thence I conclude, that Spirits separated from all Matter can act upon Matter, since God, who is a pure Spirit, is the Creator of it, and governs it still by his Son and H. Ghost, his Infinite Wisdom and Power. But whether there are any other pure Spirits, or whether they are united to some parts of very thin and subtile Matter, to serve them instead of *Vehicles*, is what neither I, nor perhaps any Man living, can uncontestably determine. In the mean while my comfort is, That all the Phenomena may as easily be Solv'd by supposing that God gives to Spirits the power of moving a portion of Matter, as by conceiving that they are inseparably united to some other portion of Matter, by which means they may move a far greater part of it.

But I remember an Objection of the *Peripateticks* that seems to be worth answering: What you urge, say they, concerning the unmoveableness of Matter, is only true of Matter dispos'd into forms, of particular and separated bodies, or of aggregates of those bodies, and not of the first Matter, *Materia prima*, which is neither *quanta* nor *qualis*, nothing sensible or determinate, but a most pure and simple Essence. What Gibridg is this? Do those Gentlemen understand what they say? If they do, let them explain themselves in ordinary terms. If they cannot do it, why do they presume to affront

affront Mankind, and even our Sacred Religion, with such an Impertinent and Nonsensical Language?

If those Philosophers have any distinct Notion of their *Materia prima*, they must needs conceive it under the Idea of that infinite space, or intellectual extension, which I have describ'd in the 3d and 10th Letter of these Memoirs. But then it is so far from proving Matter to be Eternal, that it is an Invincible Argument for the Eternity and Incorporeity of God, and the Creation and Dependency of all finite Beings. For whatever is annihilable in its own Nature cannot be Eternal, since what exists of itself is independent, and that which can be annihilated depends upon him who can annihilate it. But all finite Beings are annihilable, for I can suppose them annihilated or non-existent: All, I say, besides these three, *viz.* an Infinite Wisdom, who resolves to annihilate or to create them, an Infinite Power, who performs it, and an Infinite Space that remains after their annihilation, and was before their creation. These three are Eternal and Self-existent, since they cannot so much as be annihilated even by supposition; and they are withal a Glorious Image of the ever blessed Trinity, the Father being that Immense-All, the Origin and Fountain of the Deity, the Father and the Creator of all, the Son his infinite Wisdom, and the H. Ghost his infinite Power. An Image that agrees well enough with the expressions of the H. Scripture. However, I dare not insist upon it, because the Sacred Writ speaks of the Father, Son, and H. Ghost, as of three distinct Persons or Subsistences, whereas Immensity, Infinite Wisdom, and Infinite Power, seem only to be three Attributes of the Deity, tho' they be the chief ones, and the source of all the others. I am satisfy'd with this, That the Divine Revelation teaches me there are three Persons in God, and that my Reason assures me, this Mystery is so far from implying any contradiction, that three Divine Persons must of necessity have one and the same Nature and Substance. As to the manner of their Distinction, Subsistence and Unity, I leave it to that Day when the Prison of this Body shall be broken, when instead of seeing God through a Looking-glass, we shall contemplate him face to face.

III. The other Questions are not Metaphysically demonstrable, so that we must content our selves with what the H. Scripture, credible Relations, and our own Experience teaches us concerning them. The 3d is, Whether Spirits are good or bad, Friends or Enemies to Mankind. I answer, That there are of both sorts. As to the Infinite Being, none can doubt but that he is the Goodness it self, since

since he is the most perfect Being, and the source of all Perfections. And as to finite Spirits, the H. Writ speaks so plainly, and so often, of good and bad Angels and Spirits, that he must needs be very confident who presumes to deny the existence, or the operation of the latter, as I am inform'd that a late *Dutch* Author has done. But I suspend my Judgment, because I have not yet seen his Book. Besides the Sacred Authority, I am apt to believe that in the Spiritual World things go much alike as in this Corporeal; so that there are good Angels, blessed Souls, Devils, Hob-goblins, Damned Spirits, as we have here Just and Learned Men, Knaves and Fools. However there is this notable difference, That the degrees of Virtue and Wisdom, Wickedness and Folly, are probably much more consummate in Spirits free from Terrestrial Bodies than they are in us. 1. Because of the nicety of their Organs, if they be join'd to any Organical Body. 2dly. Because of the long time they may be suppos'd to have pass'd in that state.

IV. The fourth Question has two parts; As to the first, Whether there are different Orders of Spirits? I have already declar'd my self for the affirmative, in the XVII. Letter of these Memoirs, but never since met with any proof or objection that made me alter my thoughts. I am not ignorant that it's a common Opinion of the Protestants, that all Angels and Humane Souls are alike amongst them; and whereas we perceive a sensible difference betwixt the latter, this they pretend to Solve, by saying, That it only proceeds from the various conformation of the several bodies to which they are united, and especially of the Brain, which is afterwards increas'd by the diversity of Education. I know that in this state of Corporeity, the Soul is much depending upon the Body, tho I may sincerely protest, that never any outward accident that I can remember, did so far disturb my inward Constitution, as to benum, or even weaken my Understanding: (a) But as to Imagination and Memory, they have so great a relation with the Body, that I am sensible of a notable increase or decrease in them, according to its various alterations.

(a) See
Works
of the
Learned
Art. 58.

As to Education, and other exterior helps to Knowledge, I grant that they contribute very much to its Improvement; for our Understanding and Natural Light are like sparks of Fire, that will kindle sooner or latter, more or less violently, according as they are blown up, and as the combustible Matter that is put upon them is more or less dispos'd to take Fire. But that these outward Succours are not the chief Spring, whence flows that substantial Oil, which affords nourishment to the Eternal Lamp of our Minds, does plainly appear

appear from thence, that we often see two Brothers born of the same Parents, and brought up in the same House, and with the same care, of whom one shall become a great Man, whilst the other shall remain a Blockhead, or a person of mean Parts. So that after all, the Objectors must have again recourse to the first evasion, *viz.* the different conformation of the Corporeal Organs; which indeed I cannot directly confute, because I know not the nature and inward configuration of the minutest particles of our bodies. But neither can they give direct proofs of their assertion, whereas the instance of two Brothers, sometimes so different in Learning and Virtue, tho' they have seen the light in the same climate, receiv'd life and breeding from the same Parents and Masters, and do not sensibly differ in Age, Health or Constitution: This instance, I say, is a strong presumption to the contrary.

Add to this. 1. That the Holy Writ gives several names to the blessed Spirits, calling them *Angels, Cherubims, Seraphims, Thrones, Dominations, Principalities and Powers, Psal. xviii. 10. Isa. vi. 2. Col. 1. 26.* Which seem not only to be names of Offices, but also of several Orders and Subordinations. Besides that, considering the infinite Wisdom of God, this difference of Offices does probably imply a difference of natural and acquir'd knowledge. 2. St. Paul speaking of the future State, infers from the Diversity of Corporeal Creatures, that there shall be a difference betwixt those who shall participate of the heavenly happiness. *All flesh, saith he, is not the same flesh, but there is one kind of flesh of Men, another flesh of Beasts, another of Fishes, and another of Birds. There are also Celestial Bodies and Bodies Terrestrial, but the glory of the Celestial is one, and the glory of the Terrestrial is another. There is one glory of the Sun, another of the Moon, and another glory of the Stars: For one Star differs from another Star in glory. So also is the Resurrection of the dead. 1 Cor. xv. 39, 42.* It's true, the Apostle makes only use of the second similitude, that of the Celestial and Terrestrial Bodies; but 'tis plain enough how the others may be applied, and that they needs import a difference amongst holy men, after the Resurrection. However there shall then be no diversity of Air and Food, neither do I see any probable cause of a different conformation of their brain. 3. The stupendous variety of bodies, which makes us judge that their nature is different, is a strong inducement to believe that there is something alike amongst Spirits. For that variety of bodies is so great, that even two Apples of the same Tree differ in bigness, colour and savour, and the very grains of sand, that seem so alike do sensibly differ in bulk, colour, transparency and figure, when view'd through a good Microscope.

And were our Eyes more piercing, and other Senses less dull, doubtless we should perceive a greater diversity betwixt Bodies. 4. Supernatural Gifts are all different, as *S. Paul* teaches, *1 Cor. xii.* The Reason he gives of it is, That the Church is a Body, of which Christ is the Head: And that as the Composition, Beauty and Conveniencies of the Body, require a variety of Members, so there must be likewise a variety of Gifts for the Compleatness, Splendor, and Service of the Church. Why then should not there be for the same Cause and Harmony, a difference in Natural Gifts, or in the very Essence and Nature of Spirits, since all the World is the Palace of God, in whose Construction great and little Stones may find a convenient place; and since by this variety, the Infinite Beneficence, Wisdom and Power of God, is more plainly manifested, as may be seen in the fore-mention'd XVII. Letter?

The 2d part of the 4th Question, *Whether Spirits are so far Subordinate to each other, as that the power of a Superior Spirit may altogether suspend the operations of an Inferior*, is very difficult to solve; and being the main Hinge of the whole Controversie, we cannot proceed too warily. As to God, the infinite Spirit, there is no doubt but that he can Suspend, and even alter the Operations of all other Spirits; but the Question is, *Whether he will do it?* for I have many pregnant Reasons for the Negative. God being the Goodness itself, has Created Spirits, or thinking Beings, to make them happy; but they cannot be so, unless they enjoy him, who is the Sovereign Good, as far as the reach of their Capacities will allow; and the Sovereign Good cannot be enjoy'd but by knowing and loving it. All Spirits therefore have been Created to know and love God. How comes it then that so many of them seem not to care for him? We must go up to the very Original of things, to find out the Solution of this hard Problem. Knowing is comparing things together; for without such a comparison, there is neither distinct Knowledge, nor lively Sensation. We know Pleasure by Pain, Health by Disease, Virtue by Vice, Harmony by Discord, &c. and therefore when God Created Spirits, he withal, or very soon after, Created Matter, the most imperfect of all Beings, since it's meerly Passive, and destitute of all Sense and Knowledge; however 'tis such as may give a pleasant diversion to finite Spirits, by the diversity of forms it's apt to receive. I conceive that God gave power to these Spirits, to move and model some determinate Portions of this Matter, and perhaps united a confus'd sensation of Pleasure, to the Modifications they put it into, that they should the more willingly perform his Commands. In the mean while they were perfectly

fectly free; that is, They had an Absolute Power over their Will and Operations; Matter made no violent impressions upon them, but only such which they might suspend as they listed, and always prefer Spiritual Pleasures to Material Sensations, if they would but consult their Natural Light, or the Idea's of the Infinite Wisdom, in whatever they undertook.

But that all did not do it, is too plain by Scripture and Tradition. Whether the fall'n Angels lost their Primitive Integrity, by neglecting Spiritual Meditations, and yielding too easily to confus'd Sensations; or whether they were seduc'd by the false promises of an Ambitious Spirit, as our first Parents were, I will not presume to determine. This only is plain to me, That there is an Evil Spirit, who is the chief of all the rest, whose Original Sin most probably was his endeavouring to Debauch, Seduce and Enslave his Fellow-Spirits, and to set up a Kingdom in competition with the Almighty. In this Rebellious design he still persists, and in reference to it, is call'd the *Devil, Satan, or the Slanderer, the Accuser of our Brethren, who seduces all the World, the Old Snake, the great Dragon, a roaring Lion, that walks about seeking whom he may devour*; and we are often forewarn'd to beware of him, and not to afford him an advantage over us. See *Isai. xiv. 12, 16. Mat. xii. 26. 2 Cor. xi. 3. 1 Pet. v. 8. Revel. xii. 9, 10, & xx. 2, 7, 8.*

And now the case is quite alter'd; for St. Paul says, *Know ye not that to whom ye yield your selves servants to obey, his servants ye are whom ye obey; whether of sin unto death, or of obedience unto righteousness*, Rom. vi. 16. A very remarkable Sentence. *Know ye not*, says the Apostle; 'tis then an undoubted Truth that we are Naturally free, but that we may lose that Liberty by a continu'd compliance, either with a Spirit of Rebellion, or with God's Commands. And as the good Angels have been confirmed for ever in their Primitive Integrity, and are become altogether impeccable, by an uninterrupted observation of Gods Laws; so the bad are become Absolute Slaves of their Passions, and withal, of one another, according to the several degrees of their Natural Power and Subordination, and have harden'd themselves for ever in their Apostacy, by an obdurate perseverance in their wicked and malicious Designs.

Thence I infer, that no Liberty, properly so call'd, can be ascrib'd either to good or bad Angels. For as to the good, they have intirely devoted themselves to God's Service; they never consult when he Commands, and do readily comply with each other, for that end, in their respective Stations: So that if they ever consult, or suspend their Judgment, 'tis only to chuse which way is the best,

when they have no exprefs Orders. As to bad Angels, they have conceiv'd such an inveterate hatred against the good, and against all the Creatures of God that have not yet totally Apostatized, that they never deliberate but to chuse the most pernicious methods to compass their malicious ends, and must either willingly or by force presently comply with their Tyrannical Superiors, for that purpose. See *Matt.* xviii. 10. *Heb.* i. 14. *Joh.* viii. 44. 2 *Pet.* ii. 4. 1 *Joh.* iii. 8. *Jud.* 6.

But as to Man, as he is yet in the state of Trial, he ought, it seems to be perfectly free, and so he was doubtless when he came first from the hands of God, *Eccles.* vii. 29. I shall not now inquire into the causes and manner of his fall, for that would carry me too far from my subject. I shall only suppose, as a truth that cannot be denied by any rational Divine, tho he were a Heathen, that there is a Corruption in Humane Nature, or that God did not Create Men as imperfect and wicked as they are, however that they are not for the most part so desperately corrupted, as to be past all hopes of recovery. Let's consider what will follow from thence.

Men that are good or bad to extreams are few in number, and would not give us a true notion of the present state of Mankind. Let's then cast our Eyes upon the generality of men, who are, as I may say, neither too good nor too bad. The best of this sort may properly enough be compar'd to one that has been cur'd of a dangerous disease, but not so perfectly as to be wholly secure from all relapse; for he has now and then some little touches, or forerunners of his former sickness. If this man observe a good diet, and use from time to time proper remedies, he may at long run recover his health; but if he take no care of himself, he runs a hazard to fall worse than before: Every one understands that Ignorance, Self-love, Natural Pride, Voluptuousness and other passions are that perilous Disease, whereof a good Education, the Light of the Gospel, &c. may be suppos'd to cure us, tho never intirely in this life; so that we must perpetually stand upon our guard, otherwise we expose our selves to that dreadful fate threatned by our Saviour, *Matt.* xii. 43, 45. by S. Paul, *Hebr.* vi. 4, 8. and by S. Peter in his second Epistle, ii. 19, 22. *For of whom a man is overcome, of the same he is brought in bondage.*

I shall not enlarge upon the manner of the conversion of men, lest Criticks should say, that I write a Common Place instead of a Philosophical Letter; but from the Principles laid down before, draw the following conclusions. 1. All finite Spirits are naturally free, or have been created so. For as God is the supream Good, and

and deserves to be preferr'd to all others, so he will be lov'd by a free choice, and 'tis the height of happiness to know that our choice is the best. 2. The liberty of good Angels should rather be called a Spontaneity, for they perform their Duty most willingly, but never consult whether they shall do it; neither do they ever suspend their Judgments in reference to true or false, good or evil, because they never want light, and are not possess'd with prejudices and passions, so that they always chuse the truest and the best. And I cannot imagine any occasion, wherein they should suspend their Judgments, unless it be in some difficult circumstance, when they have no express Orders from God, but then their doubts may be quickly resolv'd, either by their natural light and acquir'd knowledge, or by the dictates of the Infinite Wisdom, who never fails to answer the expectation of their humble and earnest desires. 3. Bad Angels are most spontaneous and willing in doing evil, but not free at all, because they hate virtue and truth, and therefore will never choose it, unless it may accidentally serve their ends, or they be forc'd to it by God, who sometimes is pleas'd to restrain their malice. Besides their dependance on the Almighty, they are Slaves to each other, according to their natural subordination, or the agreement they have made amongst 'em, in and after their Apostacy. In general, Spirits that have taken a settled course of life, and do not want light to pursue their designs, are but improperly call'd free, for liberty and firm resolution are but opposite Terms. 4. Men only are properly free, since they only, for ought I know, are in a state of trial. Those that have given themselves over to their passions and prejudices, have almost lost their liberty, for they suspend their judgment very seldom, and act for the most part blindly. Sincere Lovers of truth and justice are the freest of all, for they rarely undertake any thing of consequence, without consulting the natural and the reveal'd Light, by attention and prayer. But those that are most confirm'd in wisdom and virtue are rather spontaneous than free, because they are so much us'd to the answers of the eternal truth, in what concerns their spiritual knowledge and salvation, that they understand it as in a moment. However they have still occasion of their liberty, because they are still liable to temptations, and that ignorance is inseparable from this mortal state.

Now I may solve the latter part of the fourth question and the first part of the fifth, with some certainty. 1. God ever had power to suspend the operations of all Spirits, but he thought not fit to use it whilst they underwent their Trial. 2. Now he works upon good Angels at their desire, or out of meer Beneficence. 3. He refrains.

refrains the malice of Devils and wicked Men, and often forces them to speak the truth against their Will; and even sometimes to promote Virtue, and to be the Executioners of his Judgments. All which he does either by a direct influence, or by the unsearchable Springs of his Wisdom. 4. He acts upon good Men by his ordinary Grace, and sometimes by the inspiration of the H. Ghost, and Supernatural Gifts; for tho they be in a state of Trial, yet their Natural Light and Liberty being much impair'd by their fall, they should not be able to withstand their passions, and the assaults of the Devil, without the Coelestial assistance. 5. Good Angels act upon each other, when they exchange, as I may say, their Thoughts; they may likewise, by the order or leave of God, act upon Just Men, either by assuming Corporeal shapes, and speaking sensibly with them, or by moving the Nerves and Fibres of their Brain, in the way that is requir'd to raise such and such Thoughts, to pronounce such and such Words, or to perform such and such Actions; but they have nothing to do with the Wicked, unless it be to oppose, or punish them by God's Command. 6. Bad Angels may suspend the Spiritual operations of their Slaves, for they deal with them with a more than Arbitrary and Tyrannical Power. As to Just Men, tho they may sometimes by Gods permission vex them in their Goods, and even in their Body, yet they have nothing to do with their Mind. And therefore if there be now Men really posses'd with the Devil, I have not much better opinion of them then of Wizards and Witches; for *resist the Devil and he will flee from you*, Jam. iv. 7. Had those Men given no room to the operations of that wicked Spirit, by Melancholy, Murmuring, Blasphemy, Despair, or some other grievous Sin, 'tis not conceiveable God would have granted him such a great power over them. But most of the Stories of this Nature, which I have examin'd, prove meer Cheats, as I shall make it appear in some other Letter. And if somebody vouchsafe to send me faithful and well attested Relations concerning this matter, I doubt not but that I shall be able to explain them by the Principles I have laid before, and shall set down hereafter.

Perhaps the greatest part of Readers would have been better pleas'd that I had related some strange Stories, and made a short Comment upon them, than to follow me through this long and troublesom way of Reasoning; for most People are as much tir'd by Reading Metaphysical Discussions, as their Authors by setting them up, without considering that this Method, how tedious soever it appears, is the only sure way to attain to Knowledge; so that

September, 1693.

285

that I foresee I shall have but little thanks for my pains. But if you approve of them, and vouchsafe to help me, in order to Correct and Improve my Notions, I shall esteem them not altogether unprofitable; for I am confident every unprejudic'd Philosopher and Divine, that has Read what you have Writ concerning Tradition, will agree with me, That I have made choice of as good a Judge of Metaphysicks as any there is in the World.

September 26.

LETTER XXXVIII.

To the Honourable Sir Robert Southwell,
President of the Royal Society.

ARGUMENT.

The Author's unwillingness of entring upon Controversies. His Quotation of a passage out of Mr. Newton's Principia Mathematica clear'd. The Hypothesis of the II. Letter of these Memoirs grounded upon the Demonstrations of Mr. Newton and Huygens. An Experiment to make sensible the force of the Circular Motion, and the inequality of the Diameters of the Earth. What Proportion there is betwixt the quantity of void Spaces, and the quantity of Matter in this Globe. The Theorist's Philosophical and Anatomical mistakes. How the Earth after the Flood came insensibly again to its former Equilibrium, by the foremention'd Proportion? That Proportion is demonstrable. The Possibility of a motion of the Earth far swifter than its diurnal circulation. A wholesome Advice to the Theorist.

Honourable Sir,

WHat the Wisest of Kings said, That of making many Books there is no end, and that much Study is a weariness of the flesh, is especially true of Publishing new Hypotheses, for one cannot certainly tell where he shall stop. Those Thoughts concern-
ing

ing the formation and drowning of the Earth, which I had set up for your diversion, rather than any other insight, have met with so many Curious Examiners, that I fear lest I be insensibly forc'd, against my first Resolution, to *Compose huge Volumes in their Defence.*

Some Criticks, not very Learned however, have pick'd a suppos'd fault out of the end of the XXI. Letter of these *Memoirs*, where I say, that *I could alledge the Authority of that Incomparable Mathematician Mr. Newton, if Philosophers were to be convinc'd that way, because he thinks that even now the situation I have given to our Globe, viz. to turn upon its shortest Diameter, and to be set upright upon the longest, is requir'd to keep the Waters down; and therefore the overflowing of the Sea is a necessary consequence of the inclination of the said Globe.*

It's pretended that I have mistaken Mr. Newton's Opinion; but this is a Matter of Fact that can be quickly decided, and I leave you, Sir, and every other Learned and Impartial Reader, to judge of it. The passage which I allude to is contain'd in the 3d Book, the 17th Theorem, where he proves this Proposition, *The Axes of Planets are shorter than the Diameters that are drawn upon them, in the following manner.* "Had not the Planets a Diurnal motion, as their
"parts lay equally heavy upon one another, so they would be perfectly Spherical; but this Circular motion causes the said parts to
"remove from the Axis, and to tend upwards to the Equator.
"And therefore if Matter be fluid, it will increase the Diameters
"of the Equator by its ascent, and diminish the Axis of the Poles.
"Thus the Observations of Masters *Cassini* and *Flamsteed*, agree in
"this, That the Diameter of *Jupiter* is observ'd to be shorter betwixt the Poles than from East to West. And by the same reason, were not our Earth a little higher under the Equator than
"under the Poles, the Seas would subside towards the Poles, and
"ascending along the Equator would overflow all. *Eodem Argumento, nisi Terra nostra paulo altior esset sub Aequatore quam ad Polos, Maria ad Polos subsiderent, & juxta Aequatorem ascenderent, ibi omnia inundarent.*

Then he goes about this Problem, *To find the Proportion of the Axis of a Planet to the Diameters that are perpendicular to it*, which he makes out by the following Principles. That the force, by which the Circular motion drives upwards the parts of the Earth under the Equator, is to the Natural Gravity by which they tend down to the Center as 1 to $290\frac{4}{5}$; so that if there were a Canal full of Water going from one Pole to the other, and another perpendicular to it from the Zenith to the Nadir, the Gravity of the Water running from Pole to Pole would be to the Gravity of the Water descending

ing along the Equator, as 291 to 290, because the force, by which the Circular Motion, causes the parts of the Equator to remove from the Center, would Counterbalance $\frac{1}{291}$ of their natural gravity. 2. Then comparing the gravity of bodies towards the Poles and the Equator, supposing the Earth to have no motion, with the force of the Circular motion by which its Diameters are made unequal, he finds that the gravity towards the Poles is to the gravity towards the Equator as 501 to 500. But 3^{dly} by the third Corollary of the 91 Proposition of his first Book, it appears that the gravity of bodies in different places, is as the distance of those places from the Center of the Planet. And therefore 4^{thly} that the Diameter of the Equator is to the Axis of the Earth, as 692 to 689; whence follows 5^{thly} that the said Axis being 19615800 foot of *Paris* equal to 3923 miles and 800 foot, according to the accurate calculation of Mr. *Picard* a French Mathematician, the height of the Earth at the Equator surpasses its height at the Poles by 85200 foot, or 17 miles and 200 foot, allowing 5000 foot to a mile.

I have related these Passages somewhat at length, to shew that Mr. *Newton*, not only admits the principle of the inequality of Diameters in the Terraqueous Globe, upon which my Hypothesis is built, but even demonstrates it *à priori*; so that the *Pendulums* shortning their Vibrations, as they are brought nearer to the Equator, is no more than a necessary consequence of this inequality of Diameters: The demonstration is plain to any Mathematician; but to make it sensible to others, Let 'em take a hollow glass-ball, pierced only with a little hole, through which let 'em almost fill it with water, and throw into it a handful of *Spanish* wax beaten to small Powder, stop the Vessel and place it on a pin, whereupon it may freely turn. They will observe that the particles of the wax, being somewhat heavier than the watery corpuscles, will sink down to the bottom of the Glass. Then let 'em give a swing to the Vessel, and the Water together with the Wax Particles will rise from the bottom along the sides of the Glass to its uppermost superficies, and continue so as long as the rotation is violent; but proportionably as it abates, the Wax, as the heaviest, will sink down to the bottom again, the Water, as the lightest, keeping up longest to the uppermost superficies, till it be also depressed to its former level, by the Air extricating it self, when the motion is wholly ceas'd.

It's evident in this instance that if the sides of the Glass did not contain the Water and Wax within bounds, they would swing away by the violence of the rotation; and so it would happen to the parts of the terraqueous globe, were not the world almost full with

matter, or as full as ever it can hold. But as I have observ'd in the XXIX *Letter*, there are little void spaces interspers'd amongst bodies, because the first corpuscles they are made of are globulous, and that motion cannot be conceiv'd in the opposite Hypothesis; but these first globules are so very insensible, that the interstices they leave amongst 'em must needs be of an unconceivable smallness. And therefore the matter of the terraqueous globe cannot fly away by its diurnal rotation, because 'tis kept down by other matter to an indefinite distance; only it can ascend along the Equator to a height proportionable to the quantity of void spaces; which, methinks, I can pretty near determine by the joint computations of Master *Newton* and *Huygens*, and say that in the terraqueous globe the quantity of void spaces is to the quantity of matter, as the length by which the Diameters of the Equator surpass the Axis of the Earth, that is, as 1 to 290, according to Mr. *Newton*, or as 1 to 289, according to Mr. *Huygens*.

Perhaps it will be objected, that this quantity of void spaces is inconsiderable, in relation to such a vast quantity of matter. But I answer first, That I see no pregnant reason, why there should be a far greater number of them. Secondly, That this suffices to conceive the possibility of motion. Thirdly, That globules so prodigiously small as the first corpuscles are, can be so complicated and crouded; that the interstices, they leave amongst 'em taken together, amount but to a very small quantity. Fourthly, That Condensation and Dilatation, the Phenomena must usually, alledg'd to prove the necessity of void spaces, cannot be intirely solv'd by that supposition; but that there must be besides a very insensible matter going out and into the condens'd and dilated bodies. Fifthly, That no probable cause can be feigned of the proportion betwixt the force of the diurnal circulation, and that of the natural gravity of bodies, unless the quantity of void spaces and that of matter be in the same proportion, as I shall prove hereafter.

By this I am sufficiently clear'd from all mistake as to the sense of my quotations, since it appears that the Principles of Mr. *Newton* and *Huygens* agree perfectly with mine, tho it may be those great Mathematicians never thought on the consequences I have drawn from thence, in order to explain the possibility of the Deluge, by the overflowing of the Sea. But I must make you admire the Philosophy of the *Builder of the new World*, as all Christians have been justly surpriz'd at his Divinity in reading his *Archæologia*. From the foremention'd Demonstrations 'tis plain, that the figure of the earth is some what oblong, so that our globe is rather a spheroid, than a sphere; which may have giv'n occasion to those

those expressions of the Ancients, the Theorist boasts so much of (a). (a) *Tellur. Theor. Sacr.*
 But withal it appears that the Axis is the shortest Diameter, and that tho it were suppos'd that it was at first the longest, yet it could not remain so during many years, much less 16 or 17 ages, as this new Philosopher pretends, except that we imagin, against all reason and experience, all the parts of the superficies of the earth as hard and contiguous as the parts of Diamonds. But if we suppose them soft and fluid as ever they were, and probably more at the beginning than they are now; it follows, that since the circular motion resists the natural gravity of bodies under the Equator, with the force of 1 to 290, in 290 days the Earth would have grown perfectly spherical; and in 290 others, have taken the form of a spheroid turning on its shortest diameter; yet not farther receded from the globular figure, because matter cannot be driv'n more upwards than the quantity of void spaces will allow.

Mr. Newton's passage has made me take notice of another splendid mistake of this Author. Master Cassini and Flamsteed have observ'd the diameter of *Jupiter* to be longer East and West, than North and South; and this excess must not be inconsiderable, to be perceiv'd at so great a distance. Mr. Newton calculates it as exactly as can be done, saying, since *Jupiter* turns about its center, or makes its diurnal revolution in reference to the fix'd Stars, within 9 hours 56 minutes, and since the squares of times are in proportion as 29 to 5; it follows that the difference betwixt the longest diameters of this Planet and the shortest are, as 1 to $39\frac{3}{4}$, or that the diameters from East and West and from the Zenith to the Nadir, perpendicular to the Axis of *Jupiter*, are to the said Axis, as $40\frac{3}{4}$ to $39\frac{3}{4}$. But our Theorist, more us'd to phanciful dreams than to geometrical calculations, will tell you, (b) *As to the Belts of Jupiter, which are the most remarkable Phænomenon of that Planet, I take them to be his Zones, and to lye parallel with one another; and I believe also with his Equator—If we have guess right that Jupiter is in an Antediluvian State, I should rather expect to find the figure of his Body, than of any other of the Planets, to be oval or oblong, such as our Earth was before its Deluge.—* (c) *The Globe of the Earth was (before the Flood) really divided into so many Regions of a very different aspect and quality, which would have appear'd at a distance, if they had been look'd upon from the Clouds, or from the Moon as Jupiter's Belts, or as so many Girdles or Swathing bands about the body of the Earth.* The second Edition of the Theory in English, is printed 4 years after Mr. Newton's book; and one would think that an Author, who should have more love for the truth, than affection for Witticisms and an outward shew of Learning, would not be asham'd

S f 2

of

(a) *Theoria*
SACRA
Telluris.

of mending any faults upon the demonstrations of that great Mathematician. But besides the loss of many pretty thoughts, the Theorists Rivers would have been quite stopp'd, and his Antediluvian Earth have remain'd as dry as the Desarts of *Lybia*. And what means then of presenting two Kings and a Queen with an imaginary world, of boasting to have retriev'd a *World*, that had been lost for some thousand years, out of the Memory of Man, and the Records of Time, or of setting up for Author of a Sect of *Utopian* Philosophers. *Cassini*, *Flamsteed*, *Newton*, are great names, but what signify their observations and demonstrations, since *Moses* himself loses his sacred Authority, when he stands in competition with the sacred Theory of the Earth, as its Author, and several Divines call it, but (a) in a contrary sense?

However, if I cannot flatter the Ambition of Princes with the promise of enlarging their Dominions, and the proffers of *New-found Land and Countries*, I have this satisfaction, that the Holy Writ, as well as Astronomical and Geographical Observations, conspire as much to establish my Hypothesis, as to overthrow that of my supercilious Adversary: As now Mr. *Newton's* and *Huygen's* Demonstrations open to me a new way to explain how the Earth return'd by degrees to its former Equilibrium, after it had lost it by the unusual Earthquakes, Eruptions, Tempestuous and unequal Rains, that preceded and accompanied the Deluge, and that precisely in the time set down by the H. Writer.

For supposing as in the Scheme of the 2d Letter of these Memoirs, p. 12. the Sea lying round about the Earth, as betwixt the Ovals NC, ED, SF, GW; but after it was fall'n (as it were) upon its longest Diameter EW, the Waters in WNE overflowing the Earth in MLCI, the Waters in ESW, the Earth in DFGO; since the Diurnal Circulation of the Terraqueous Globe was not interrupted, it follows that the force of that Circulation withstood still the Natural Gravity that carries Bodies down to the Center, and was with it, at least in the same proportion as 'tis now, that is, as 1 to 290. But we have reason to believe, that that proportion was then far greater. 1. Because, tho the Superficies of the Earth be now for the most part, either soft or fluid, yet 'tis interwoven with divers hard Bodies, whereas it was then cover'd all over with a Liquid. 2dly. Because the many Earthquakes, Eruptions, Winds and Rains, that preceded and accompany'd the Deluge, had put all the parts of the Earth at a considerable distance from its Superficies, in such a violent Commotion, that it render'd them fitter to propagate the vehemence of the Diurnal rotation, and to resist the natural gravity, with greater force than they do now. 3dly.

3dly. And therefore the Sacred Historian fixes the time of the prevailing of the Waters over the Earth to 150 days, *Gen. vii. 24.* during which it may be suppos'd, that by the force of the Diurnal Circulation, the Waters ascending from the Poles, North and South, towards the Equator, the Terraqueous Globe took a Spherical Figure.

Julius Africanus, a Christian Chronologer, whose Chronicle *Eusebius* thought fit to insert in his, as being the most accurate of his time, assures us that the Years of the H. Writ are of 12 Months, and the Months of 30 days, making in all 360 days. But we need not have recourse to Humane Authority, for, from the 1st day of the 10th Month, to the 1st Day of the 1st Month in the next following Year, *Moses* reckons 40 Days and 3 Weeks, that is 60 or 61 days, *Ch. viii. v. 5, 13.* Which is very observable, and shews that the abating or sinking of the Waters down to the Poles followed the increase of the Equinoctial diameters almost geometrically. On the 17 of the 7 month (77 days after the Terraqueous globe had taken a spherical figure, and when the proportion betwixt the Circulation and Gravity was already as 77 to 22330) the Ark rested on the Mountains of *Ararat*, which most probably were the highest of those whereon that Vessel swam. On the 1st day of the tenth month, the proportion being as 150 to 43500, the tops of the Mountains were seen. 54 days after, both forces being in proportion as 204 to 59160, the Waters were so far retir'd, as to let appear the summities of such Trees as grow in the Plains: And on the 27th of the 2d month, or 13 month 27 days after the beginning of the Flood, when the proportion was as 268 to 77720, that is almost the same as 'tis now, or as 1 to 290, *Noah* and all his Family, with all the Animals he had preserv'd alive, went out of the Ark, a great part of the Earth being sufficiently dry'd, because God had rais'd a Wind to drain it, proportionably as the Waters retir'd towards the Poles, or sunk into the Canals and Plashes they had digg'd during their stay upon the ground.

It's worth our inquiry to examine why that proportion betwixt the force of the diurnal Circulation, and the natural gravity should be so constant. I have already said, that I could find no probable cause, unless it were this. As the excess by which the Diameters of the Equator surpass the Axis, is to the same Axis, or, as the force of the diurnal Circulation to remove bodies from the center of the Earth is to the force of the natural gravity to carry them down to the said center; so is the quantity of void spaces to the quantity of matter in this our Globe.

For, because Circulation is an active principle, whereas heaviness

is.

(a) Lett.
xxxvii.

is a passive quality, proceeding only from the impenetrability and unactivity of matter; tho the disproportion betwixt both be so very great, yet in process of time the former would gain upon the latter, as upon an enemy that can make no resistance of its own, (a) if matter could be driven up higher than the summity of the Equator, from the top of the Atmosphere of an orb to its center, that is higher than the present quantity of void spaces will allow. As in the instance formerly mention'd, the Water and Wax would be flung out of the Ball, were they not kept within by the sides of the Glass.

This Hypothesis is very agreeable with the Phenomena, and, methinks, I could by its means solve a great number of difficulties in Physicks. At present I shall content my self with observing that it gives a very probable account of the possibility of motion, and of the nature of gravity: We need not have recourse to any imperceptible Matter, or magnetical Virtue. Bodies go down to the center, because they are unactive and impenetrable; so that were the diurnal motion superseded but one day, they would replenish all the interspers'd vacuities, and jump into a Chaos not much unlike to the former.

(b) *Disc.
de la cause
de la pesan-
teur.* p. 157.
Leyde 1690.
(c) Lett.
xxi. p. 168,
169. Lett.
xxxi. p.
241, 242,
243.

I have observ'd in Mr. *Huygen's* ingenious Treatise concerning the cause of gravity (b) a Corollary that will give a great light to the conjectures I have publish'd in former Letters, (c) viz. That to disentangle the parts of the Chaos, God gave it a motion 40 or 48 times swifter than its diurnal circulation. Mr. *Huygens* says, that if the diameter of the Equator should be double of the Axis, and the Earth turn 17 times swifter than it does now, the force of that circulation to remove bodies from the center would be equal to their gravity; but if it should be more vehement, the bodies at the summity of the Equator would fly into the Air. Suppose it then 26 times swifter, the diameter of the Equator will be $3\frac{1}{2}$ longer than the axis, and the Terraqueous Mass will be neither a globe nor a spheroid, but have the figure of two *Parabole* join'd together by their extremities. And as the violence of that motion would have been more than sufficient, to sever the various bodies of the confus'd congeries; so, the great declivity of the *Parabolæ* would have carried the Waters down to the Poles in a day or two. So that the more I meditate upon *Moses's* account, the more rational I find it.

(d) p. 143.

According to the same Author, (d) there is still a fluid matter that has a swiftness 17 times greater than the diurnal circulation of our Globe, for it resembles a body, that should turn about its superficies in the space of an hour 24 $\frac{1}{2}$ minutes. And lest this motion should appear too violent, he proposes to imagine a physical point advancing only a degree upon an ordinary geographical Globe, with-

in 14 seconds, which is the space that this fluid matter runs through within such a time; for this motion will seem to be slow, rather than swift.

I could wish I had more time to digest these *Memoirs*, I should not be so often at correcting or improving my notions. But I am like the blind man of *Bethsaida*, who at the first touch of our *Saviour* saw men as trees. *Mark viii. 29.* And it can hardly be otherwise in my unhappy circumstances, when I have scarce any other help, but my own meditation. And therefore I am so far from having less regard for Dr. *Burnet's* parts, because of any mistakes I may observe here and there in his Writings, that I would have as great an esteem of his sincerity and modesty, as I have of his Learning, if he were pleas'd publickly to declare, that he did not write his *Archæologia* for vulgar capacities, since he seal'd it up in the Tongue of the Learn'd, that he has propos'd many things that are taken as his direct opinion tho they be bare objections; that if he seem inclin'd to give an Allegorical interpretation to the first Chapters of *Genesis*, 'tis meerly by reason of the difficulties of the literal sense; and that there are some things in his Books, which he would willingly mend if he were to write again.

LETTER XXXIX.

To Mr. *Reve Williams* Mathematician.

ARGUMENT.

Theorems to find the beginning of the Twilight, the Declination of the Sun being North, South, or in the Equinoxes. How to find when it finishes at night.

Honour'd Sir,

I Present you with some Theorems, that may be of use in that excellent Art, in which you prove so serviceable to your Country, I mean Navigation. For by their help we may find to a 2^d the precise

Sun's depression under the Horizon (*viz.* 18 degrees) *L* a the Sun's Declination to the North.

I. Let's then take for the first instance the Latitude of London 51 degrees 32m. and suppose the North declination to be 10 degrees. Because in the Spherical Triangle *ZPL* there is given *ZL* the distance of the Sun from the Zenith, 108 d. *ZP* the complement of the Latitude 38^d. 28', *PL* the complement of the Sun's Declination 80^d., we have but to find the Angle *ZPL*, which may be done by this Proposition.

As the Rectangle of the Sines of the Sides ZP mult. into PL (a) containing the Angle sought is to the Square of the Radius's (b) so is the Right-angled figure of the Sines of the ½ Sum (c), and ½ difference of the Base (d), ZL, together with the difference of the Sides PL—ZP (e), to the Square of the Sine of ½ the Angle sought.

Logarithms.	
(a)	19. 7871832
(b)	20
(c)	19. 7232861
(d)	20. Add
(e)	39. 7232861
	Sub. 19. 7871832
	Rem. 19. 9361029

The half of the Remainder, 9.9680514, gives the Logarithm of 68^d. 18', which being doubled make 136^d. 36' for the Angle sought *ZPL*; subtract this from the ½ of the circumference 180^d. remains 43^d. 24'; convert them into time, and you'll have 2^h. 53' 36" for the beginning of the twilight.

II. Let's now give an instance when the Sun removes to the South, and suppose the Declination to be 5^d. in the same Latitude. Because in the Triangle *SLN*, *LN* the distance of the Sun from the Nadir 72^d., *SL* the complement of the Sun's Declination 85^d. *SN* the complement of the Latitude, 38^d. 28', are giv'n, there remains but the Angle *LSN* to be found; which is done by this Canon.

As the Rectangle of the Sines of the Sides LS mult. into SN containing the Angle sought (a) is to the square of the Radius (b) : So the Rectangle of the ½ Sum (c) and ½ difference of the Base NL (d), together with the difference of the sides LS—SN (e) is to the square of the Sine of ½ the Angle sought.

Logarithms.	
(a)	19. 7921759
(b)	20
(c)	19. 2775123
(d)	20.
	Add.
(e)	39. 2775123
	Sub. 19. 7921759
	Rem. 19. 4853364

The Bisection of the Remainder 9. 7426682, is the Logarithm of 33^d. 34' the double of which is 67^d. 8' the Sine of the Angle sought *LSN*: convert this into time, and you'll have 4^h. 28' 32" for the beginning of the Twilight.

III. When the Sun cuts the Equinoctial, the operation may be made as before, but because it may also be done by a Theorem that is less troublesom, I shall set it down here, and the proof by Logarithms in the Margin. Imagine only *ab* to be the Arch of an Azimuth, and the quantity of it to be 18 degrees. Then say. *As the Sine*

T t

of

Logarithms.

(a) 9. 7938317

(b) 10.

(c) 19. 4899824

(d) - 9. 7938317

Rem. 9. 6961507

of the complement of the Latitude (α) OQ (viz. $38^d. 28'$ is to the Radius; (b) so the Sine of a b viz. $18^d.$ (c) is to the sine of a A, that is less (d) $29^d. 47'$ subtract them from $90^d.$ remains $60^d. 13'$, which converted into time give $4^h. 15.2''$ for the beginning of the Twilight.

I know that the refractions light may suffer through Vapours, Exhalations and Clouds may oft in such things hinder a complete agreement betwixt practice and speculation. But besides the pleasure that there is in knowing Geometrical Truths, such a competent abatement may be made for these Refractions, as that the proposed Theorems will be useful in any place, and for the most part of the year.

To find out the duration of the Twilight, or at what time it finishes after Sun's set, you need but know exactly the time of the Sun's rising and setting, then having made your operation for that day, and found the beginning of the Crepuscle, add to the Sun-set the time that passes betwixt the beginning of the Twilight and the Sun-rise, and 'twill give the time of night that the Crepuscle finishes. This, Sir, is not written for you, but for young Scholars, to which I wish that these *Memoirs* may also prove useful.

M^r. Bernoulli's Canon for finding the shortest Twilight prove likewise Geometrical, but the Demonstration is too long to be inserted here.

F I N I S.

ERRATA in July.

Page 226 line 41 for 1593, read 1573 or 1574. l. 42 add after Montpellier 1593. p.

227. l. 2. Lewis xiii r. Henry iv. l. 3. 1621 r. 1611.

In August,

Page 257 line 16 of in Terms blot out in

The CONTENTS.

- Letter XXXVI. On the Stone in Men's Bladders or Loins. 263
 Lett. XXXVII. On the Nature and Properties of Spirits, to know whether there are men really possess'd with an evil Spirit distinct from their own Soul? 273
 Lett. XXXVIII. The Continuation of the II and XXI Letter. The Proportion betwixt the quantity of void Spaces, and the quantity of Matter in this Globe. 285
 Lett. XXXIX. To determine Geometrically the beginning of Twilight at any time of the Year. 293

F I N I S.

MEMOIRS FOR THE INGENIOUS.

CONTAINING
Several Curious Observations in *Philosophy,*
Mathematicks, Physick, History, Philology, and
other Arts and Sciences.

IN
Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

OCTOBER, 1693.

To be continued Monthly.

VOL. I.

*Non semper ea sunt quæ videntur, decipit
Frons prima multos, rara mens intelligit,
Quod interiore condidit curâ angulo.*

Phæd. Tral. l. 4.

LONDON, Printed for W. Rhodes at the *Star*, the Corner of
Bride-lane in *Fleet-street*. And for A. Harris at the *Harrow* in
the *Poultrey*. 1693.

Where are to be had the Memoirs for *January, February, March,*
April, May, June, July, August and *September*.

MEMORIAL

1807

IN GEORGETOWN

1807

For the purpose of recording the names of the persons who have been admitted to the rights and privileges of the Corporation of the City of Georgetown, from the year 1807 to the present time.

Miscellaneous Entries

1807

OCTOBER 1807

Also be considered separately

VOL. I

The names of the persons who have been admitted to the rights and privileges of the Corporation of the City of Georgetown, from the year 1807 to the present time, are as follows:

1. John Smith, Esq. admitted on the 1st day of October 1807.

2. James Brown, Esq. admitted on the 15th day of October 1807.

3. William Jones, Esq. admitted on the 20th day of October 1807.

4. Robert White, Esq. admitted on the 25th day of October 1807.

5. Thomas Black, Esq. admitted on the 30th day of October 1807.

6. George Grey, Esq. admitted on the 5th day of November 1807.

7. Henry Gold, Esq. admitted on the 10th day of November 1807.

8. Charles Green, Esq. admitted on the 15th day of November 1807.

9. Richard Hall, Esq. admitted on the 20th day of November 1807.

10. Samuel King, Esq. admitted on the 25th day of November 1807.

11. Daniel Lee, Esq. admitted on the 30th day of November 1807.

12. Edward Lewis, Esq. admitted on the 5th day of December 1807.

13. John Martin, Esq. admitted on the 10th day of December 1807.

14. George Nash, Esq. admitted on the 15th day of December 1807.

15. Thomas Owen, Esq. admitted on the 20th day of December 1807.

16. Robert Parker, Esq. admitted on the 25th day of December 1807.

17. William Reed, Esq. admitted on the 30th day of December 1807.

18. James Scott, Esq. admitted on the 5th day of January 1808.

19. Charles Stiles, Esq. admitted on the 10th day of January 1808.

20. Richard Taylor, Esq. admitted on the 15th day of January 1808.

21. Samuel Ward, Esq. admitted on the 20th day of January 1808.

22. Daniel Wright, Esq. admitted on the 25th day of January 1808.

23. Edward Young, Esq. admitted on the 30th day of January 1808.

24. John Zane, Esq. admitted on the 5th day of February 1808.

25. George Adams, Esq. admitted on the 10th day of February 1808.

26. Thomas Baker, Esq. admitted on the 15th day of February 1808.

27. Robert Campbell, Esq. admitted on the 20th day of February 1808.

28. William Clark, Esq. admitted on the 25th day of February 1808.

29. George Evans, Esq. admitted on the 30th day of February 1808.

30. Henry Fox, Esq. admitted on the 5th day of March 1808.

31. Charles Gibson, Esq. admitted on the 10th day of March 1808.

32. Richard Harris, Esq. admitted on the 15th day of March 1808.

33. Samuel Hill, Esq. admitted on the 20th day of March 1808.

34. Daniel Jones, Esq. admitted on the 25th day of March 1808.

35. Edward King, Esq. admitted on the 30th day of March 1808.

36. John Lamb, Esq. admitted on the 5th day of April 1808.

37. George Lee, Esq. admitted on the 10th day of April 1808.

38. Thomas Miller, Esq. admitted on the 15th day of April 1808.

39. Robert Nelson, Esq. admitted on the 20th day of April 1808.

40. William Oliver, Esq. admitted on the 25th day of April 1808.

41. James Paine, Esq. admitted on the 30th day of April 1808.

42. Charles Quinn, Esq. admitted on the 5th day of May 1808.

43. Richard Rogers, Esq. admitted on the 10th day of May 1808.

44. Samuel Stone, Esq. admitted on the 15th day of May 1808.

45. Daniel Thomas, Esq. admitted on the 20th day of May 1808.

46. Edward Turner, Esq. admitted on the 25th day of May 1808.

47. John Walker, Esq. admitted on the 30th day of May 1808.

48. George Young, Esq. admitted on the 5th day of June 1808.

49. Thomas Wright, Esq. admitted on the 10th day of June 1808.

50. Robert Zane, Esq. admitted on the 15th day of June 1808.

Memoirs for the Ingenious.

OCTOBER, 1693.

LETTER XL.

To the Right Reverend Father in God,
Simon Lord Bishop of Ely.

ARGUMENT.

Occasion of this Letter. Why the Author does not make use of the Argument drawn from Miracles, to demonstrate the truth of the Christian Religion. Another Demonstration founded upon 13 Postulates containing undeniable Matters of Fact. That the three first Centuries, during which Christianity was establish'd, were the learnedst of all Antiquity. That Our Lord and his Apostles could be no Deceivers. That no private Correspondence can be imagin'd betwixt our Saviour and the Heads of the Jews. That no happy circumstances can have mov'd him to assume to himself the quality of the Messiah. That he could not have succeeded in the attempt. That the first Christians were neither Beggars nor Fools, but honest and sensible men. Of Mahomet. Of the Patriarchs of the Monks. That Deists deserve to be punish'd as infamous Calumniators, and publick Disturbers.

My Lord,

A Superstitious scrupulosity can oft do as much hurt to Religion, as the daring boldness of those petulant Spirits, who will
U u confine

confine the infinite Majesty within the narrow reach of their understanding; or limit the unsearchable Springs of the Almighty's Providence, to the weak power of their frail Machin. This your Lordship was sensible of, when you publish'd in *English* that incomparable Treatise of *Gratius*, concerning the *Truth of the Christian Religion*, with excellent Illustrations and Additions of your own, and so many Paraphrases and Notes on several parts of the Holy Scripture; together with divers Books of Divinity and Morals. By this, as your Lordship shew'd on the one side that we are not afraid of the Objections of our Adversaries; so you made on the other the way to Salvation plain and easier, and rendered Christianity more lovely, and if I may so speak, more adorable. And therefore none, I suppose, will find fault with me for presuming to follow so great an Example.

Our Saviour, and his Apostles after him, proved that he was the Son of God, sent by his Father to Redeem and Convert Mankind, by his Miracles, *John* v. 25, 38. *Act.* iii. 16. This was an undeniable Argument for those that heard and saw him, especially because he did such Miracles, to which no humane Art, nor even any finite Power can attain, as to tell men, and even just too, what were their thoughts, *John* i. 48, 49. For no finite Spirit can work upon another (a) that is in the state of Tryal, or in the love of God, so far as to be conscious of its thoughts, without Gods leave or express order.

(a) See
Letter
xxxvii.

But for us who live 16 or 17 hundred years after, as Miracles are of themselves extraordinary and incredible things, and those of our Saviour are not distinctly related by any other Author besides his own Disciples, whom the incredulous suspect, as tho they had spoken of him in too high terms, these Miracles cannot be a direct proof, since not one that believes them doubts of Christ's Mission and Divinity. Let's then take another course, and suppose only such matters of fact as are confest on all hands.

1. That there has been such a man as *Jesus of Nazareth*, born in *Judea*, under the Empire of *Augustus* and the Reign of *Herod*; in some of the years of *Rome*, betwixt 748 and 753.

2. That he lived there 33 years and a half, according to the common opinion, or 38 years, as *Mr. Dodwel* pretends; and was much famous and followed by many people, the 3 or 4 last years of his life.

3. That at last all his Followers, either forsaking him, hiding themselves, or not daring to appear in his behalf, he was taken up and hanged on a Cross.

4. That after his Death some of his Disciples took heart again and preached his Doctrin so successfully, that within 40 years they con-

converted great numbers of *Jews*, and within 200 years after a good part, and I may say the far greater part of the *Roman Empire*, besides other Converts in *Persia, India, &c.*

5. That Christ's Apostles were good, honest and sensible men, but not extraordinary Learned and Eloquent.

6. That there appears however in their Writings an uncommon sort of Wisdom, consisting in an exceeding Zeal for the spreading of what they conceiv'd to be Truth and Virtue, and in a particular Skill to direct Men to the way of their eternal Salvation.

7. That such a Style cannot be affected: That is, that the Apostles could not be Learn'd and shrew'd Politicians, who hid their natural and acquir'd parts under a pretended simplicity. For no Man can perpetually disguise his Style and Manners; the Truth would have appear'd through some cleft, and have betray'd the whole Intrigue.

8. The Writings ascrib'd to the first Disciples of our Saviour, at least the Gospels, the Acts of the Apostles, and the Epistles of *St. Paul*, are really theirs. For this may be proved by an uninterrupted Tradition, as well and better than that *Virgil* has written the *Aeneid*, *Cicero* the Oration *pro M. Marcello*, &c.

9. Our Saviour, his Apostles, and most of his first Disciples, were of the common sort of Men, and rather Poor than Rich.

10. The Christian Religion has not got footing by force of Arms, or by Intrigues of State, for its Professors were expos'd to the Persecution of the *Roman Emperors* during 300 years; if not actually under it; and favour'd by no Nation nor Sect, but equally hated by *Jewish* and *Heathen* Priests, by Rabbies and Philosophers, by *Pharisees* and *Stoicks*, by *Sadducees* and *Epicures*.

11. Christianity does not flatter any passions, vices, or prejudices. Contrariwise, it forbids Luxury, Covetousness, Ambition, Wrath, the excess of all Pleasures, and even to better our condition by unlawful means. It commands to obey our Superiors, to prefer the profession of the Truth to every thing, and to our very Lives, to submit our Reason to the Divine Revelation, &c.

12. As the *Roman Empire* was in its strength from the Birth of our Saviour to the Conversion of the Emperor *Constantine*, so those three Centuries are reck'ned the most Learn'd of all Antiquity. Now an Age is esteem'd Learn'd, not when some Ingenious men are to be met with here and there, for that was ever so; but when the common sort of People has a competent deal of knowledge, which appears by the smoothness and elegancy of the Tongues they speak, the Arts that flourish among them, and are brought every

day to a greater perfection, the accuracy of Style in most part of Writers, their checking and ridiculing vulgar Errors without any molestation, &c. All the Learn'd Criticks agree, That since the *Babylonian Captivity*, the *Jews* have cultivated Sciences more than ever; and to convince the Reader of it, I need only to make him remember, 1. That they never fell afterwards into Idolatry. 2. That the Doctrins of a Resurrection and future State were then taught more generally and plainer than before. As to the Heathens in *Cicero's* time, Prodigies, Auguries, Divinations, Oracles that were so frequent and so much in Request before, began to grow out of fashion; and when *Augustus* had restor'd Peace to the World, Oracles became quite silent, either because the New-born Saviour forbad 'em to speak, as some Divines use to say, or that People grew too wary to be impos'd upon. Moreover, Ingenious men took oft the Liberty to ridicule the receiv'd Religion, as does *Horatius* in the following Verses, which are a Sarcastm of Idolatry in general, tho they seem only to deride *Priape's* Worship.

*Olim truncus eram ficulnus, inutile lignum;
Cum faber incertus scamnum faceret ne Priapum,
Maluit esse Deum: Deus inde ego, surum, aviumque
Maxima formido.*

Formerly I was the stump of a Fig tree, an insignificant piece of Wood; when a Carpenter advising by himself whether he should make a Bench or *Priape*, chose to make a God of it. Thence I was a God, the great terror of Thieves and Birds. Confer *Isa. xlv. 15.* for 'tis a pleasure to see that even Jewish Prophets could scarce deride Idolatry more sarcastically than the Heathen Poets.

But lest it should be said that *Horace* was an Epicure, let's hear the Wise and Religious *Virgil*.

*Postquam Res Asiae, Priamique evertere gentem
Immeritum visum superis.*

After the Gods had thought fit to ruin the Affairs of Asia, and the Family of *Priam* without cause. Certainly if the Poet did not design to ridicule his own Religion, he had forgot the Notions of common sense, which teach us that the Sovereign Governor of the World must needs be a Being full of Goodness, and incapable of Injustice.

Ovid seems to have undertaken his Metamorphoses, on purpose to ridicule the Pagan Divinity, which was kept secret amongst the Priests.

Priests. For to publish such absurd Mysteries, is to expose them to the scorn of the Vulgar. And I am apt to think, that tho there are throughout the Writings of the Greek and Latin Poets several allusions to that Fabulous Theology, yet not one before him had presum'd to give out a System of the whole. This doubtless is the cause of that mighty boast by which he concludes his Work,

*Jamque opus exegi, quod nec Jovis ira, nec ignes,
Nec poterit ferrum, nec edax abolere Vetustas.*

I have finish'd a work, which neither Jupiter's Anger, nor Fire, nor Sword, nor the All-devouring Time will be able to destroy. Wherein I observe by the by, how little he values the wrath of that pretended Father of Gods and Men. *Lucian* went still farther, for he chose for the Matter of his Dialogues the most ridiculous Actions that were related of their Gods, and set them down in such a Style as was proper to inspire the utmost Contempt: But God, who knows how to turn evil to good, made use of these Atheistical Wits to prepare the way to his Gospel; for the generality of Men cannot be without Religion, and if you inspire them with a disgust of their own, they will quickly run to another. It's then an undoubted Matter of Fact, that the World was never more Learn'd than in the three first Centuries of the Church, and less susceptible of deception; and hitherto we have seen that this disposition of People favour'd the insensible increase of Christianity, which is a very favourable presumption of its Truth. Let's then proceed.

13. A Deceiver cannot succeed so far, as that his Laws and Institutions should be receiv'd through several Nations, and become in a short time the Rule of the Publick Religion and Worship, unless they flatter the Passions, Vices and Prejudices of Men, that both he and his chief Abettors be extraordinary Eloquent, or great Warriors; That they be able to carry on their Designs with Men and Money; That they be help'd either openly or privately by a powerful Faction; That they have to do with unthinking People easie to be led about; And that they built upon a giv'n Ground; that is, Upon a Receiv'd and Reverenc'd Opinion. I desire all the Incredulous Tribe to alledge the instance of a Deceiver that wanted most part of these Encouragements, and has however succeeded; whereas I could Quote great Numbers, who with all these together have been unsuccessful, or only of a short standing.

These

These Propositions are so very plain, that they need not to be prov'd, neither does the compass of these Letters allow me to do it. Those that have the least doubt about the 1, 2 and 8 Propositions, may consult your *Grotius*, and many other Books, that are, God be prais'd, common enough. And therefore an Impartial Reader will not deem me unreasonable, if I take these Propositions for *Postulates* to build on a *Demonstration of the Christian Religion*, as follows.

Christ said that he was the Messiah, the Son of God, sent from his Father to Redeem and Convert the World, and has done it accordingly, as we are taught in the New Testament; but neither Christ nor his Apostles could be Deceivers; and therefore what Christ said of himself, and his Disciples of him, is true. The *Major* is Matter of Fact; the *Minor* I prove thus. By the 13th Proposition, That a Deceiver may succeed so far, as that his Laws and Institution should be receiv'd through several Nations, and in a short time become the Rule and Standard of the Publick Religion and Worship, several things are requisite, which are not to be found either in our Saviour or his Apostles, but rather the quite contrary Qualifications. As, 1. That they should flatter the Passions, Vices and Prejudices of Men, as do Heathenism, Mahometism, and some Popish Tenets, which propose the remission of Sins by telling them to a Priest, or buying off the Punishment; whereas by the 11th Proposition, Christianity does not indulge Vices, but forbids Voluptuousness, &c.

2. It's requir'd that both the Deceiver and his Chief Abettors should be extraordinary Learn'd and Eloquent, such as the *Egyptian* Priests, *Solon*, *Lycurgus*, *Numa Pompilius*, or great Warriors, like *Nimrod*, *Mahomet* and his Successors. It's indeed said of our Saviour, that never Man spake like him; and there was also in the Apostles a sort of uncommon Wisdom. But we must consider what this Eloquence and Wisdom were. They were in our Saviour a short and ponderous way of expressing himself, a Majestick Air proceeding from the Consciousness of his own Birth and Natural Dignity, which gave an admirable weight and authority to whatever he said, though he thought not fit to unfold that Sacred Mystery, before fickle or incredulous Hearers. In the Apostles this Eloquence and Wisdom consisted in a firm perswasion of the truth of the things which they related, as having either seen or heard them from the Mouth of that Infallible Oracle, their Divine *Jesus*; and in an exceeding Zeal to propagate those truths, as being the only means to procure the eternal Salvation of Men. As for being Warriors,

Warriors, 'tis known, that neither Christ nor his first Disciples were any thing like it. That most part of the *Roman* Empire was already *Christian*, and better *Christians* than they were afterwards, when *Constantine* embrac'd the Gospel-faith; which join'd to the Persecutions the Disciples of our Saviour lay so oft under, during the three first Centuries, takes away any suspicion that his Doctrine should have been establish'd by force of Arms, according to the 10th Proposition.

3. It's necessary that the Deceivers should be enabled to carry on their designs with Men and Money. As were *Nimrod*, *Mahomet*, the Caliphs of *Babylon*, the *Sultans*, the *Popes*, &c. which appears by their Wars, Croisado's, Persecutions, &c. But what signify'd twelve Fishermen, with a Tent-maker, in relation to the Conquest or Conversion of the World? See *Propos. 9.*

4. It may be imagin'd that a powerful Faction, affording a private help to a Deceiver and his few Abettors, might supply the want of Men and Money. By some such means it was that *Cromwell* got the Sovereign Power of these Isles into his Hands, being privately push'd on, by those who gap'd, as it were, at the Kings Houses and Lands, the Estates of the Nobility, and the Revenues of the Church, tho it may be doubted whether this aspiring Man drew the first Scheme of his Designs, before he was advanc'd to the Charge of Lieutenant-General of the Parliaments Army. However it be, this is certain, That his Courage, Successes, Craft and Policy, made him great numbers of Creatures and Admirers in the said Army, who were the chief Promoters of his rise.

Let's now see whether the most subtle Sophisms of Incredulity can invent any thing that hath a shew of probability to intercept the Rays of our Saviours Divinity. There were then 5. or 6 prevailing Interests in *Judea*. 1. That of the *Romans*, the Court and Courtiers call'd *Herodians*. 2. That of the Priests and Divines. 3. That of the People. 4. That of the *Pharisees*. 5. That of the *Sadducees*. And 6. That of the *Essenes*. These six different Interests may be reduc'd to two, as to Politicks and Government, viz. 1. That of the *Herodians* endeavouring to keep up the Dominion of the *Romans*, and of *Herod* under him. 2. That of the People, longing for their Ancient Kings, Liberties and Priviledges, to which Interest most of the Priests and Pharisees did covertly resort; the *Sadducees* floated betwixt both, and the *Essenes* did not meddle in the least with Affairs of State.

It's certain that *Herod* was very much hated because of its Cruelties against the Family of the *Asmoneans*, several Noblemen and Persons

Persons of Note, whom he had caus'd to be Murder'd upon light Suspicions, or to seize on their Estates. As to his Sons and Successors, as they had neither the Power nor the good Qualifications of the Father, but several of the bad, so they fell by degrees into the utmost Contempt. What belongs to the *Romans*, as no Nation, especially so proud as the *Jews* ever were, loves to be Govern'd as a Land of Conquest; it's certain that they would have been glad to be rid of that Foreign Power, which appears by their unwillingness in paying those few Taxes, which their Conquerors lay upon them, and withal by their frequent Seditions; but they had no Head to resort unto, and were too weak, and too divided to undertake a general Rise successfully.

The *Jews* read never more the H. Scriptures than at that time; but their Ambition and Pride had drawn upon them the Curse of *Isaiah* vi. 10. They saw that the time of the *Messiah's* coming was expired, because the *Scepter*, or the Sovereign Power of their Common-wealth, was transferr'd to a Foreign Nation, *Gen.* xlix. 10. His Family, the place of his Birth, his double Nature Humane and Divine, his Offices of King, Prophet and High-Priest, the most remarkable Actions of his Life, and his Ignominious Death, were all set down in the Prophetical Books. But their Teachers had infatuated them with this prejudice, That the *Messiah* would make himself known by his Preaching and Miracles, and having drawn by those means vast numbers of People, put himself at their head, fight and overthrow the *Romans*, and not only restore their Country to its Ancient Liberties, but even Conquer all the World, or make all other Nations their Vassals and Tributaries.

In the mean while, the *Pharisees* were in the Lurch waiting for the rise of some great Man, who would shake hands with them, take upon him the Quality of *Messiah*, behave himself, and manage the People, according to their Directions. For as they were the most powerful Faction of all, the greatest part of the Priests and *Sanhedrim* being of their Sect, and having a great influence over the Vulgar; so they expected, and, humanly speaking, with some reason too, that none should undertake the conduct of the People without consulting them. And therefore as soon as *John the Baptist* arose, they fail'd not to send Deputies unto him to know what he was, and what he pretended to? (a) and perceiving by his Answers he was not minded to follow their Advices, nor to give out himself for the *Messiah*, they began to Defame him, got him Imprisoned, and at last Beheaded.

(a) *Joh.* 1.
15, 28.

Their

Their Embassy to S. *John* having had so ill a success, they would not expose themselves to a second affront. However, as soon as JESUS began to be follow'd and talk'd of, they fail'd not to come about him, to tempt and pump him, in order to try whether he would not be a Messiah of their own making. But when they saw that our Saviour scorn'd such base actions, that he intended nothing but the Reformation of the World, which he would have begun by themselves, then they fell at slandering and persecuting him, and, having oft attempted it in vain, to Murder him, or let him fall into a Snare; at last they seduc'd one of his Disciples, frighted the others from him, and having bought false Witnesses, deliver'd him into the hands of the *Roman* Governor.

These Holy Cheats thought to do in this a great piece of Service to their Country; for, say they, *this Man* will not consent to be King, neither is he proper with all his Wisdom to head a multitude, for he despises Riches, the Sinews of War and Government. All his Admirers and Followers will melt off, when they are weary of his Sermons, or have gotten from him what they require. Besides that, who knows whether this Virtue of Healing is a Quality inherent in him; and tho it were, it will signify very little as to shaking off the *Roman* Yoke, since he never makes use of it to punish his Enemies. And therefore the best Counsel we can take, is to deliver him as a Rebel to the *Roman* Governor, lest he be forc'd or tempted by his Followers, some day or other, to accept of the Kingly Power, and not being able to maintain himself, the *Romans* come upon us, and destroy this H. Place and our Nation, *John xi.* 47--50.

Thus Flesh and Blood are used to argue; and God knows how many *Pharisees* his adorable Son would meet with, if he came again amongst us. But to proceed. It's certain our Saviour can be no Deceiver, if there was no private agreement betwixt him and the *Pharisees*, Priests and Heads of the *Jewish* People; for how could some poor Fisher-men, and a few inconsiderable Friends or Relations, who were even afraid to acknowledge him, and whom he did not otherwise much mind; how could they give him that great Reputation, which sounded through all *Judaea*? How could they entice so many Men to counterfeit the Blind, Lame, Deaf, Leprous, &c. that they might afterwards publish they had been Cur'd by him? And if all these were but Cheats, how came so many quick-sighted Enemies never to discover any of them? These two things are certain, 1. That the incredulous *Jews*, both Ancient and Modern, who have invented so many shifts to impair

the weight of his Miracles, never contested the truth of them, but ascrib'd them to a Magical Power, or some such ridiculous Cause. 2. That it is impossible to conceive how after *Christ's* Death, the Preaching of his Disciples should have been so successful, had he not done those Miracles that are related in the Gospels, and perhaps more than are there mention'd.

After all what has been said, he must be of a very strong imagination, who can still fancy any private Intelligence betwixt our Saviour and the Heads of the *Jews*. But let's give way for a moment to that ridiculous Notion: Let us suppose, that as the *Pharisees* bore, without earnest hatred or desire of revenge, all the Reproaches of our Saviour, and saw without indignation the utmost contempt he shewed on all occasions for their Traditions and Ordinances; so on the other side, he tacitly consented to undergo the infamous and pining punishment of the Cross, on condition that they would not let him dye, but take him away betimes, that coming to himself again, it might be reported abroad he was risen from the Dead. All this we know to be false, for his side was pierced through with a Spear, and all the blood to the most ferous and watry substance exhausted; after which no man can live. Besides that, the Body of *Jesus* was not carry'd very far, or out of the sight of his Enemies; but because it was a *Preparation-day*, the Evening before the great Sabbath of *Easter*, he was Buried in a new Sepulchre, wherein was never man yet laid, in a Garden lying in the same place where he was crucified, John xix. 34, 41. Add to this, that his Enemies, who judg'd of others by themselves, were afraid of some Cheat, and made the Sepulchre sure, sealing the Stone, and setting a watch over it, Matth. xxvii. 66.

(a) Joseph
of Arima-
thaa and
Nicodemus.

But tho the Narration of the Evangelists be so circumstantiated, that it leaves no room for doubt or deception, yet let us suppose that it does it. Who were the mighty men who manag'd the whole Intrigue? Two men alone (a) could not do it, it must have been a Plot of many Confederates; and those too of the first Rank and Quality. Why did they not declare for *Jesus* after his Resurrection and Ascension? The pretended Cheat could not be push'd on farther; and it had thitherto so well succeeded, that they had only publicly to acknowledge it for a continued Series of Miracles, to draw the whole Nation on their side. Then it had been an easie matter to find out some Ingenious and Couragious person to head the bewitched multitude; and since they were so prone to be deluded, to contrive Orders from Heaven, that commanded them to go and fight the *Romans*. But those very men, who wink'd at real Se-
ditionous

ditionous *Ezechias*, *Judas*, *Theudas*, who set up *Barchochabas*, and so many other false *Messiah's*, persecuted the Disciples of the true Christ, when he was himself out of the reach of their fury.

If it be absurd, and altogether improbable to feign a private correspondence betwixt our Saviour and the Heads of the *Jews*, then he kept none at all with any body living, and consequently neither he, nor his Apostles, were Deceivers, but had really and immediately their Mission from Heaven. For 'tis impossible that a man, without Humane and Divine help, destitute of Riches, Power and Friends, should put into his Head to change the Religion of a whole Nation, especially such a one as was very Learn'd in its Law, and firmly believ'd it had been giv'n and establish'd by God himself, and confirm'd by many Miracles: Or if any man could be so mad, it is unconceiveable how he could succeed. However, for the sake of the Truth, I am minded to be again as kind to incredulity as I can. Let's then suppose that *Jesus* by a fortunate chance being issu'd out of *David's* family, born at *Bethlehem*, and the *Jews* at that time longing for the coming of the *Messiah*, *Jesus* himself, or some of his acquaintance, who perceiv'd he was a man of parts, resolv'd to set him up for the *Messiah*. If so be, those Gentlemen were not very fit to draw up plots, or to make contrivances. For they could not be ignorant that the Priests and Pharisees were the leading-men of their Nation, and that they had prepossess'd it with that opinion, which was then generally receiv'd, *viz.* that the *Messiah* should be a King, the Restorer of their Liberty, and the Conqueror of the World. Why did they suffer him to sculk at a Carpenters shop, during 30 years? Why did they not cause him to be brought up among those great men, that he might insensibly insinuate himself into their favour? Why did they not privately convey Money into his hands, that he might be able to keep his followers together, and raise their expectations?

The supposition of any correspondence of *Jesus* with other men, being so absurd, let's now see whether he alone with the few Disciples he could get, were able to carry on the design, still supposing with the incredulous that it was a deceit: Where was the Money to buy up so many men, as testify'd that they had been cur'd at his command? For tho he left but 120 faithful Disciples, that kept constantly together, and immediately after his Resurrection and Ascension, assembled themselves, and publicly profess'd to acknowledge him for their Master: Yet it may truly be said, that during his life he had shaken the foundation of *Judaism*, or rather *Pharisaism*, through all *Palestina*, by his Preaching and Miracles, and even

through all the corners of the Earth, where the *Jews* were spread, because of the correspondence the members of that Nation ever kept together. Otherwise, if neither Christ nor his first Disciples made any Miracles, let any body tell me, how it came to pass that on the bare saying of the Apostles, that their Master was the Son of God, and risen from the dead, so many thousands of men embrac'd Christianity, forsaking such ordinances as they firmly believ'd to be of divine institution, which was own'd by their new Teachers.

(a) 1 Cor.
1. 20.

And let no body say that the first Converts were a heap of poor simple Fellows, easy to be deluded; for besides that the Apostles were not very fit to it, I deny absolutely that assertion. Indeed S. Paul says to the *Corinthians*, (a) that *not many wise men after the flesh, nor many mighty, nor many noble were called*. But what are the most part of those men that go even now under the notion of learn'd men? Nothing but an inextricable Chaos of pride and prejudices: I have try'd it a thousand times, that Truth has not more dangerous enemies than great pretenders to Learning, and next to them, luxurious, lazy, and fanciful people: Whereas I have often met with persons of mean breeding, that conceiv'd at the first time such high and metaphysical speculations, as I had not been able to make apprehensible to men of a vast reading, in many conversations. The first Christians were poor; I grant it in this sense, that they were but of ordinary fortunes, or such as made not a great figure in the world; and God would have it so, lest they should be tempted to meddle with the almost continual disturbances of the *Roman Empire*, and thereby dishonour their H. Religion. However, none of 'em went a begging, or fell heavy to strangers; they had enough not only for themselves, but even to supply the necessities of those whom the persecution of their enemies forc'd to fly from place to place.

(a) *Sergius*
a *Nestorian*,
and *Batyras*
a *Jacobite*.
(b) *Aly*,
Abukeker,
Omar and
Odman.

All this consider'd, I can hardly conceive how some ignorant and prophane men can go to that excess of impudence as to make an odious comparison betwixt Christ and Mahomet. Mahomet, I say, who owes his rise and the extent of his Religion to the means of his Wife, the silliness of his Country-men the *Arabs*, the shrewdness of two (a) Arch-hereticks, the weakness of the *Greek Emperours*, and the valour of his Captains, especially his first Successors (b). His *Alcoran* is the greatest piece of nonsense I ever read, but 'tis written in good *Arab*, and therefore it was fit for the purpose.

*Omnia enim stolidi magis admirantur amantque;
Inversis quæ sub verbis latitantia cernunt;*

*Veraque constituunt belle quæ tangere possunt
Aures, & lepidò quæ sunt fucata sonore.*

Lucret. l. i.

I supersede speaking of his Sham-miracles, that are but ridiculous stories, as the Half-moon that fell into his hands; or childish tricks, as the Angel *Gabriel* that came in the form of a Dove, whispering to him I know not what mysteries, whilst he was in his fits of the Falling-sickness. Had I liv'd in his time, and found a fair opportunity, I would have kill'd the pretended Angel, and there had past, I am sure, a considerable time, before another had been so well taught. But I extremely pity the poor wretch, whom he entic'd to descend into a pit, and to cry, whilst he was passing, *Mahomet is the great Prophet sent from God*; but then caus'd the Pit to be immediately fill'd up with Stones, and the credulous fool to be murther'd there, lest at some time or other he should discover the Cheat.

I shall not insist upon his allowing Poligamy, and preaching a voluptuous Paradise; but only observe, that as true *Christianity* is the Religion of the Spirit, the most pure and sublime Philosophy that can be conceiv'd, or the highest reach of sound and enlighten'd Reason; so *Mahometanism* is the grossest and most impure mixture which flesh and blood, or passions and prejudices can make up, in counterfeiting the worship of God. There is not one Metaphysical notion in that whole system, save that of the Unity of God, and that of the Stoick *fatum*, the former of which that Impostor kept, because it was the current Doctrin of all the world, and the second he renewed to encourage and harden his Souldiers, that they might willingly undergo all manner of dangers; but he renewed it upon his bare authority, without giving any reason for it, and so as he teaches it, it is utterly false and detestable, since from thence it plainly follows that there is neither liberty nor religion, neither future reward nor punishment.

As to the Patriarchs of the Monks, their progresses have nothing surprizing in them; for besides that they had to do with a silly ignorant multitude, already engag'd in many superstitions, and prone to any delusion whatever; and that they built upon a good ground, viz. The veneration of all their Countrymen for Christianity; they were secretly encourag'd, and perhaps directed, by the Popes, who as soon as these new upstarts had brought their dreams to any perfection, and found a competent number of credulous or deceiving followers, did not fail to approve of their dreams, and to give them the force of law. And that both the vulgar and their new Disciples might have a greater Veneration for these Founders of Orders, they

they used to *Canonize* them, and to turn them into Saints, or rather Idols, to open a new door to false miracles and deceptions. The same may be said of all the parts of Popery; that mystic *Babylon* having been built by pieces, and during the course of many ages.

These objections and answers might be carried farther, but the usual compass of these Letters does not allow me to do it at this time. I shall only observe in the close, that if the incredulous complain, that I have borrow'd some historical, but very credible matters out of the new Testament, I'll answer that I am necessitated to do so, until they produce another History of those times as credible and as well circumstantiated as the Gospel and Acts. If they have none, how can they judge of our Divine Jesus, and how dare they be so impudent as to accuse him and his Apostles of deception? It's plain, that they deserve the punishment both of Calumniators and publick Disturbers, or rather Enemies to Mankind; for they do not intend to set up *Mahometism* or *Paganism*, they are too ridiculous Sects; but would, if possible, extinguish all manner of Religion, that people might cut one anothers throats, without remorse or conscience.

Octob. 20th.

LET.

LETTER XLI.

To the Honoured Dr. Dickinson, of the
Colledge of Physicians of London.

A R G U M E N T.

The Necessity of joyning the study of Natural Philosophy with Divinity. That a person in health cannot forbear Meat and Drink beyond a certain term, as 14 days, or perhaps 3 weeks at the utmost, prov'd by physical reasons. What would happen if God should suspend the Law of the Communication of Motion. That miraculous Fasts do probably proceed from such a suspension. Moses's Fast, Christ's Fast and Temptation, Elijah's Fast explain'd. How we shall live in Heaven without eating and drinking? The Cheat of a Nun that pretended to live only upon the Holy Sacrament, how discovered. A strange Story of a young Maid in Darbyshire, supposed to have liv'd 5 years without eating or drinking; attestation of the matter of Fact. Another Story of a Dutch Maid pretended to have liv'd 8 months without any Meat or Drink. That Religion is not concern'd in these relations. What can make 'em doubtful, in general; in particular, as to the English, and as to the Dutch Maid. What Physical Account might be given of both, in case they were true. The true cause of the Rheum. That the pores of the Transpiration, and those of the Sweat are not all the same.

Honoured Sir,

IF all Physicians had as much insight in Criticks and Divinity as your self, some of 'em would make a better use than they are said to

to do of their knowledge in natural things. And I have likewise observ'd that such Divines, as altogether neglect the study of Philosophy, often run to those extreams that expose Religion to the railings of the incredulous. To avoid stumbling against one of these blocks, I sometimes apply my self to the Theoretical part of your Art, seeing by your Books you have been so successful in joyning divine and humane Learning. And I hope you will be so far from finding fault with me, that you will rather encourage me in the attempt.

The study of Natural Philosophy seems to me the more necessary, that I do not see how we can without it give pertinent answers to some objections, which Atheists use to make against the miracles mention'd in the Holy Writ, pretending that they are all either contradictory impossibilities, or only extraordinary things, of which they can, say they, produce many instances.

Physicians do all agree that men cannot live without taking any nourishment, beyond 7, 11, or 14 days; and consequently *Moses*, *Elijah*, and our Saviours fast that lasted 40 natural days, have been look'd upon in all ages as altogether miraculous. However, 'tis objected, that some persons bear fasting longer than others; so that 'tis hard to determine the precise time of every mans power in this. Add to this, that the Stomach may often be full of a viscus matter that blunts and intangles the sharp pointed corpuscles which excite hunger and thirst; besides, that there may be form'd some obstruction in the Nerves of the Orifice of the Stomach, that stops the communication betwixt 'em and the Brains.

But after all, a man can scarce live any considerable time in that condition; for we know that all the heterogeneous liquors that circulate and undergo several filtrations, as do the blood and humours of humane bodies, must perpetually subtilize, alter the shapes of their corpuscles, the grossest conglobate into a *caput mortuum*, and the most subtle vanish or transpire through the pores of the body, in which they make their gyrations. And as that *caput mortuum* has yet some spirits or particles capable of a greater subtilization, if the *Rectum* be shrunk or too close, or the body so weak that it has not a sufficient force to expel those excrements, then they will ferment by their own weight and the remaining natural heat, and send fumes up to the Brain; that shall create a fever, transport or madness; whilst the rest of the Body shall grow extremely weak and lean, because the sharp corpuscles that do perpetually increase, by the repeated circulations of the humours and blood, without new aliment to repair the evaporated particles, will feed upon the most tender parts of the flesh and fat.

These

These are, methinks, the natural consequences of a long fasting. But will it be said, how will you then explain miraculous fasts? Very easily; for I have but to suppose a Truth, which I can metaphysically demonstrate, *viz.* That God is not only the first mover, but also the Author of the communication and perpetuation of motion. - That is to say, that Matter is of it self impenetrable and unmovable; so that if God were pleas'd to suspend the act of his will, by which Matter moves, if the whole Universe be full, then all would remain unmovable, but in the same state in which it was at the moment of the suspension: whereas if there be void spaces interspersed amongst bodies, then they would descend to the center of the World, as far as their shapes would allow, until all the vacuities were replenished.

I suppose, that in the bodies of men, there are as few vacuities as can be conceiv'd; and therefore if God be pleas'd to keep a man miraculously fasting, he has but to suspend the communication of motions in reference to him; that is, to hinder that the Air should make any impression upon him from without, and the blood and humors circulate within his veins; but then that man ought to appear as dead, or to remain in a perpetual Ecstasy, to whose continuance it is only requir'd that the blood should softly transpire and transmit to the brain a few number of Spirits, or very subtle particles, to keep it in a state of consistency.

Thus *Moses's* and *Christ's* fasts may be ascrib'd to that Extatic power, or suspension of natural motions; for the writing of the ten Commandments on the two Tables was done by God himself. And as to *Moses* talking with God, (a) we read of no answer he made, (a) *Exod.* but only of some few words he spake at the beginning of the Ecsta-^{xxxiv. 4,}fy: all the rest is represented as spoken by God, so that the Pro-^{28.}phet's Body lack'd only some few Spirits to keep his Brains fit for perceptions and Idea's.

The power of the Ecstasy is yet more sensible in our Saviours fast. The words of the Original run thus: *Then was Jesus brought by the Spirit into the wilderness, that he might be tempted by the Devil: and having fasted 40 days and 40 nights, at last he hunger'd. And the tempter, coming near him, said, if thou art the Son of God, &c.* It has ever been the custom of pious men, when they entred into the Holy Ministry to separate themselves from the world for a time, that they might consider of the importance of their undertaking, implore the assistance of God, and his blessing upon their labours. According to that commendable use, our Lord who was to take upon him the most chargeable office that ever was, to be High Priest and Sovereign

(b) πειρᾶς
 δὴν αἰσὶν ἀπὸ
 τοῦ διαβό-
 λου, ten-
 tandus a
 Diabolo.

Prophet, or universal and infallible Teacher of mankind, to redeem and convert the World, retir'd into a solitary place, by the direction of the Spirit, or of the infinite Wisdom to which he was united, tho he knew he should there be tempted by the Devil (b); but that did not frighten him from his duty, because he was as sure of the victory as of the fight. Being come thither, he fell into an extatic ravishment, contemplating during 40 days and 40 nights the great and deep mysteries he was going to perform. At the end of the Ecstasy, his body resuming his natural functions, he felt the sharpness of hunger. And 'twas in that weak state, the most intolerable that can be conceiv'd, that God allow'd the enemy of mankind to approach him; but all the craft and fair pretensions of that old Seducer avail'd nothing, and he being overcome and forc'd to fly from our Divine Hero, was succeeded by good Angels, who by their ready services acknowledg'd *Jesus* for their Lord and Master.

(c) 1 Kings
 xix. 8.

As to the fast of *Elijah* (c), it proceeds from a different cause; for the H. Writ mentions expressly, that *by the strength of that meat*, which had been given him by an Angel, he was sustain'd 40 days and 40 nights, tho he made a great journey in the mean while, viz. from the desarts of *Beerseba* to the Mountain of *Horeb*. There is none, I believe, who doubts, but God, or an Angel by his order and direction, can prepare such food as shall keep up a man so long a time.

It's commonly believ'd, that we shall neither eat nor drink, after the day of Judgment, tho we shall then have a body with all the integral and essential parts of this. I do not remember any formal passage of the H. Scripture, on which this opinion may be grounded. Contrariwise, it is observ'd that Christ eat and drank twice with his Disciples after his Resurrection, *Luke xxiv. 42, 43. Joh. xxi. 13, 14*. However, since this notion seems to be a necessary consequence of the future incorruptibility of our Bodies, I explain it thus: viz. That they shall not be made up of such tender and separable parts as they are now, neither shall they be nourish'd by heterogeneous humors, that must needs undergo several filtrations, but the Liquor running through our veins, shall be a most pure and homogeneous substance, affording plenty of Spirits, which shall be continually repair'd, by the sweet *Æther* we shall respire.

By this small Essay you may see what great agreement there is betwixt Divinity and sound Philosophy. But as to counterfeits most of 'em have been discover'd, and their Authors cover'd with shame, or at least are still easy to be discern'd from true miracles. Such a cheat was the fast of a Nun in *Flanders*, who 80 years ago, pretended to live upon nothing save the H. Sacrament. This was believ'd

believ'd for a great while, and the false Nun look'd upon as a Saint. But one morning coming to confession to an honest plain Priest; your breath, said he, smells of Brandy. You may think in what rage this put the she deceiver, that he should presume to destroy a miracle that made so much noise, and brought her and her Monastery to great a credit. The Priest therefore endeavour'd to pacify her, so that she came to him a second time, when finding the same thing, he advised the Bishop of it, and told him withal, that our age, and a place so near *Holland*, were not proper for such deceits, which could not fail to be discover'd at one time or other, and cause a very great scandal. Hereupon the Bishop sent for the Nun, lock'd her up, and in a little time found out the cheat, viz. That one of the Sisters gave her Meat, Drink and Spirits, unknown to any one. When the Prelate pretended to chide the Nun, she answer'd it was well done of her, and she was ready to undertake this, or any other pious fraud to magnify her Convent.

But leaving those Abusers of Religion to the Judgment of God, I shall set down here two Histories, that are together so well attested and so incredible, that I hardly know what to say of 'em, and therefore would be glad that you were pleas'd to inform me farther, either as to the matter of fact, or as to the possibility of such Phenomena.

The first has been communicated to me by a Physician of quality and great repute, Sir *Theodore de Vaux*, Fellow of the *Royal Society*, &c. who relates nothing, but what himself has seen and heard. And therefore I think fit to give you the history in his own words.

August 25. 1673. Being at *Chatsworth* at the Earl of *Devonshire's*, he telling me of the strange case of *Martha Tayler*, that fasted so long; I being curious to see this person, he was pleas'd to send one with me to her habitation, which was at a place call'd *Over-Hadden*, some two miles from *Chatsworth*, in *Derbyshire*. When I came to her Mothers house, a poor Cottage, at the bottom of a great Hill, I found this *Martha Tayler* just arising, being about nine in the morning; and in a very little time she was brought by the fire side, and set in a Chair, where I began to tell her, that the Earl of *Devonshire* had sent me thither to see her, and I desir'd that she would give me a true relation of all what had past in her distemper. She spoke to me as one much beholding to his Honor, for his Charity towards her, and so promis'd me by the help of God she would say nothing but truth: She told me she was 22 years old last *Candlemas*, and until the age of eleven years she was very healthful, and was as other persons us'd to be; that about that time, angring a Neighbour of hers upon the fighting of two Cocks, he struck her a great blow

upon the reins of her back, which made her complain of a great weakness. She fell then ill for the first time, and was seiz'd with a violent Hickock, that by fits would last her three hours together, and the noise she made with it was incredible. Thus ill she continued for 14 days together, afterwards grew pretty well, so that she went to School for 10 days. Then she fell ill again, and had great risings within her, which made great noise, being as she conceiv'd wind, which would rise up to her Throat, and would cause her to lie in a Trance; yet after 14 days she got pretty well again, and went to School for 10 days more, but being at School was much troubled with the Hickock still, both by day and night. After these 10 days she fell ill for the third time, and then kept her Bed for six years together, being in a very bad condition, yet all these six years time she did eat and drink all kind of things, and did go to stool and urine as she us'd to do, but the Hickock tormented her by fits every day, making that noise that one might hear her, they say, a quarter of a mile off, or a very great way. The Doctors that then saw her, were of opinion, that she was in a Hectique Fever, tho she drunk but little, and sweated little. The two last years of these six, she perceiv'd much blood mixt with her urine, so far that one could not tell whether it was blood or urine. This brought her very low and faint, so that she expected every day when she should die; and at that time something came down out of her privy parts, very big, and in sundry long guts as it were, one of them was very long, grisly and hard, and blood in the end of it, and what came down was sever'd, so that she put several Clouts between each other, and she anointed them with Cream. She could not tell what these things were that came down, they were dry and no moisture in them; some said they were her guts, others that one was the bladder and the other the womb. However it be, in time they putrified, but did not smell ill, some part came out and moulded away, and some other part got up into her body again. For three years time these guts, as she call'd them, were so painful and troublesom to her, that she never stirr'd out of her posture, lying still on her right side, and she was once for nine weeks together, that she never slept at all; but still would be reading godly books, hearing them read, or discoursing with persons upon good things; never losing her memory or senses in the least, though she was so long without sleep.

After the two last years of her bloody urine, upon a sudden that ceas'd; then she fell into a great vomiting, and from *Michelmass* day, *September 29th*, 1667. to *St. Andrews* day, *November 30th*, 1667. she vomited up all she took, and when they would force something down,

down, it would lie in her throat, and being ready to choak her would come up again. In this time of her vomiting she went very little to stool. At *St. Andrews* day the vomiting ceas'd, and from that day unto *St. Thomas* day she took no sustenance at all, neither any kind of meat or drink, but lay quiet and had a little sleep, but all this time had no evacuation, neither by Stool nor urine. Upon *St. Thomas* day, *December 21st*, 1667. in the evening, she took three slices of an Apple; after this for five years together, she took no kind of sustenance, but the wetting of her Lips with Water, or a little Syrup of Prunes, or a drop of Claret Wine; however it could never be perceiv'd that she let down one drop of liquor. She would now and then suck a Raisin or a stew'd Prune; sometimes some of the solid parts of the Prune would get down. In all these five years she had no evacuation, neither by stools or urine, but she said that frequently she had bleedings out of her Eyes, and out of her Ears and Nose; and now and then would vomit blood.

At *Christmas* day, *December 25*, 1672. she began to take some Ale, with a bit of an Apple. At the beginning she would use little sops, but would vomit them up again; however continuing still, it did by degrees stay with her, and then she would take some mellow Pear or an Apple. In 1673, she took during the Summer, a pretty store of Gooseberries; and when she had once begun to eat and drink, had also some small evacuation by stool twice a week, and pretty hard, and by urine every day a little, about the quantity of two ounces. When *Sir Theodore* saw her, she could, as she said, take one day with another about a quarter of a pint of Ale, and eat some Gooseberries, or a little Apple, or some Pear, but could not let down any substantial meat, neither would Milk stay with her, but she vomited it up again, as she did also if she eat too much of any of those fruits. The Hickock did not trouble her any more.

As to her body, continues our ingenuous Friend, she is lean, although her face big and fleshy; her belly is all shrunk up, and there is great hollownes as if there were no intestines at all; so that if there be any they must be all shriveled up, for there is no appearance of them; her chest, or breast, is mighty high, her arms are lean, and from her elbow upwards the bone is crooked, especially the right arm, so that she has but little use of it; her thighs are hollow, and there is little flesh on her knees; the bones are very big, and so are the joints, as if she had had the Rickets, and yet she says, and her friends too, that being a Child she was free from that distemper. Her legs are lean; she never sweats but in the palms of her hands, that are almost always moist; her pulse good, but something quick;

quick; she has a good chearful countenance, talks very rationally, and very good sense, has a very good memory, and truly all she says appears to me to be nothing but truth, making great profession of Religion, and having read much, and conversed with many Godly persons, as she says, that were so charitable as to come and see her: I askt her whether she was not let blood during that time she voided so much blood by her urine? She answer'd no, because she was so weak, that they thought she would dye: but in the beginning of her sickness she was once blooded. In the time of her fasting, *September 4, 1668*, the Earl of *Devonshire* had sundry persons that watcht with her for 7 days and 6 nights together, to see if she took any thing, and as two went out, two came in: They are all credible persons, and some the Earl of *Devonshire's* Servants. Their names are, *Hannah Hollis, Dorothy Webster, Alice Trantor, Mary Jones, Elizabeth Glassop, Joan Heath, Anne Taylour, Anne Bott of Bake-well, Anne Berisford, Ruth Gates, Seath White, Mary Goodwin and Dorothy Shelden, Sarah Burton Mr. Wilson's Maid, Hester Hatfeld, Mary Coates, Hester Rydeyard, Eliz. Toft, Eliz. Wane, and Mr. Buxston's Maid Barbary Mosely, Anne Webster, Eliz. Milner and Eliz. Wolle.*

October 26, 1668. She was examined by Mr. *Edward Wood* Apothecary, and *Catherine Lister* Midwife in *Auport*, who subscribed an attestation of the matter of fact as Witnesses, together with *George Broadhurst* of *Overhadden*, whose Certificate I have in my hands.

The 2^d history is related by Mr. *Cornelius Stalpart Vander Wiel* Physician at the *Hague*, in his curious Observations, printed in the *Dutch* tongue at the *Hague*, 1686. It is extracted out of a Letter written by Mr. *Herman Van Eybergen* Minister of *Diepenheim*, in the Province of *Overysse*, to Mr. *Bruinstein*, Physician to his Royal Highness the Prince of *Orange*, now our Gracious King *William III.* and dated *July 31. 1683.*

A Maid born at *Helselaar*, a Village depending on the Lordship of *Berkelo*, in the Month of *September 1667*, took a Quartan Ague at *Zwol*, where she was a Maid Servant, in the Month of *May 1682*. After 7 weeks she went to *Diepenheim* to a Relation of hers. The first days she was there, she went sometimes abroad, and all her disease seem'd to consist in the said Fever. But in the mean while, she grew weaker every day, and lost her stomach by degrees, eating nothing else besides raw Fruits as Apples and Rapes: So that after a month she was so very sick and weak, that her death was expected at every moment, and it was impossible to let her take any sort of food, in so much that she was a month without eating and drinking, without changing her bed, or discharging her self in any manner

manner of visible excrements. But from time to time she was troubled with such violent fits, that she struck her head against the walls or the boards of her bed, and would have fallen down, if care had not been taken. And as they had put Cushions on both sides of her Pillow, to prevent unhappy accidents, she bit 'em violently during her fits, and 'could not suffer to be holden fast, especially by the head, for then her pain would redouble upon her. The Minister who has written this Relation, testifies to have seen her attack'd with those Convulsion fits, four times within an hour.

Having thus remained a month in her first bed, she was taken up in her sheet, and put upon a Bed-stead on the ground, where she lay yet 3 or 4 weeks, it being not possible to remove her, because her nerves were grown so rigid, that to touch her was to increase her pains to a terrible excess. In vain it was attempted to give her in some Broth or Beer, for nothing could go through her Throat, or if she chanced to swallow some drop of liquor, she had no repose until she had cast it out of her Breast with violent efforts. The apples of her Eyes sunk so deep into her head, that they could hardly be seen, and at last her Eye-lids were shut up, without possibility of opening them. All the comfort she had was to sleep in the evening till 12 at clock in the night, and again an hour or two about 3 or 4 in the afternoon. This long fast, accompany'd with Convulsion-fits, troubled her Head at a strange rate: for she often rav'd and call'd for Cakes, Apples and Plums, which were hung accordingly with nails against the walls of her Bed, and rot there, for she might well by whiles count 'em for her diversion, but could not diminish their number by eating of 'em.

April 13. 1683. her Father transferr'd her from *Diepenheim* to *Helselaar*, where 3 days after, viz. on the night betwixt the 16 and 17 she took a fancy to drink, and call'd her Father for it; but as she could not waken him, she fell again to sleep. In the morning she told her Father what her desire had been, and that she had a strong conceit she should recover her sight in a short time. Her Father gave her a little Wine, which she took and staid with her, without making her uneasy. An hour after, she bid her Father to kindle a light, because she fancied to see something. He did it, and approaching the Candle near her Eyes, he perceiv'd her Eye-lids to be half open. The patient would have open'd them with her fingers, but could not. On the same day, which was the 47, since her Eye-lids had been shut up, she open'd them intirely on a sudden, by the motion of her Head, but they clos'd up themselves again, for 3 or 4 days more, when she was able to open them with her fingers. *April 27,* she began to eat
a little.

a little white Bread with Honey. The following day she took a fancy to eat Bacon, and whilst it was a frying, her longing carry'd her so far as to eat some of it raw. On the 4th of *May*, she began to make water, and on the tenth to have stools. Her fits also diminish'd by degrees, and she had strength enough to stand upright, and to walk upon Crutches; but she was yet a month that she could not sit down without falling into a swoon. After that she was also rid of that uneasiness, and as soon as she could sit down, she went to *Helselaar's Church*, and then to *Diepenheim*, where our Minister saw her and writ again to Mr. *Bruinstein*, that to restore her to a perfect health, there wanted only something to strengthen her Stomach, that could not as yet well digest.

It must be confess'd, that these Relations are as strange as any thing that was ever printed with an appearance of Truth, and few people will be apt to believe them; but whatever be their fate, Religion is not concern'd with it. For *Moses*, *Elijah* and *Jesus* were in perfect health, both at the beginning and the end of their fast; and it remains still undoubted, that no man in health can fast so long. But what a sickness can produce, we are now to inquire. There are indeed several things, which can make these stories suspicious. 1. We have properly nothing to ground them upon, save the testimony of the patients and their friends; for Sir *Theodore's* relation is but what he had from the mouth of the *English Maid*. As to those that watcht her by order of the Earl of *Devonshire*, it was but for 7 days; besides, who knows not that the best watch in the world is apt to slumber sometimes? It's true they were two at once, but 'tis true also, that it has been said that they gave her Milk in the evening. She answer'd to Sir *Theodore*, who question'd her over it, that it was only to besmear those suppos'd Guts that went out of her body. Whatever be of that, the stew'd Prunes and the Raisins she suck'd were for another use; without mentioning the Syrup of Prunes and the Claret Wine, whereby her lips were, as she said, wetted: So that upon the whole, her fast cannot be taken for rigorous, or a perfect privation of whatever can repair the living Spirits. 2. The fasting of the *Dutch Maid* was stricter, tho not the seventh part so long as that of the *English*; but we have only her own word, or that of her friends for it; since Mr. *Van Eybergen*, who saw her in her Convulsion-fits, did never watch her one day. Besides, that those Cakes, Apples, Pears, Plums, &c. which she ask'd for in her ravings, and us'd to hang over her head, do somewhat spoyl the notion of a long fast.

In the history of *Martha Taylor*, there are many particulars, which will increase the suspicions of the incredulous. 1. The original cause of her sickness, a blow upon her back by an angry neighbour seems to insinuate some bewitching. For my part, I am perswaded that there may be men wicked enough to make compacts with evil Spirits, who perhaps teach or give them Poysons of an unimaginable subtilty and hurtfulness. But the effects of those poysons use to be very different from the symptoms of this Maid. However as there are several venoms whose effects are unknown to us, I will not insist upon this objection. 2. The Hickock that vex'd her so long, and was heard so far off, about a quarter of a mile, is another incredible Circumstance; not that I believe there was nothing of it, but I am apt to conjecture from this visible *Hyperbole*, that there are many others in the account she gave to our ingenious friend, and that she pleased her self in raising the admiration as well as the pity of her Visitors: and who knows but she got something by it? In 1673. she lived in a poor Cottage; now she is married to a Physician; and My Lord *Sherard* of *Darbyshire* writ lately (in the month of *September*) to Sir *Theodore de Vaux* that she was found to be an Impostor. However I would be glad to know how and by whom. 3. Those supposed Guts, that for three years together came out of her privy parts, are also very mysterious. If they were the guts, the womb or the bladder, how could she eat, digest, urin, or even live afterwards? If they were something else, what could supply so much matter, whilst she eat and drank nothing? 4. To be 5 years fasting, 9 weeks lacking sleep, and to preserve withal a good memory and the free use of her senses, appear to me as probable as the fable of the Mice, making their nest in the ear of a Cat. 5. Tears come oft out of the eyes, and there uses to sit in the middle of the ears a viscous matter, which I rather believe to be squeez'd out of the substance of the ears by sweating, than to be transpired through the Tympanon: but as to blood coming out of the eyes and ears, I never heard of it, tho I am not so learn'd in Physick, as to deny the possibility of the fact.

Let's now proceed to the *Dutch Maid*. Matters hang pretty well together in this relation. The learnedst Physicians agree in ascribing the next cause of intermittent Fevers, to a viscous matter, which mixing at set times with the blood, retards its circulation. At the beginning of her disease, this matter was already so abundant in her, as to produce a Quartan Ague of very long continuance; but it was so extraordinarily increas'd by the raw fruits she eat immoderately, that after 3 months it fill'd up her stomach, overpower'd

the blood, and stopt the pores of the transpiration. Then she must of necessity lose her stomach; but the circulation continuing still, tho very slowly, out of the filtration of the blood and humors must needs arise some sharp corpuscles, which finding no passage, struck against the solid parts of her body, until they had blunted their points, and fell again into the viscous matter, with some particles of the flesh they had broken off; and therefore she ought to grow leaner every day, and her Convulsion fits be follow'd with ravings. But at long run the viscous matter being consum'd, because some of the sharp corpuscles forc'd from time to time their passage through the stopt pores, she ought to recover her stomach and health as she did.

One thing only appears to me very difficult, which is how she was transferr'd from *Diepenheim* to *Helselaar*; for tho those two Villages are but at some miles distance, yet how could she be carry'd so far, since she was grown so very lean and rigid by her long fast and the stopping of her pores, that she could not suffer to be brought from one bed into another, and that a good while after she had begun to eat and to recover her health, she could not sit down without falling into a swoon.

The story of the *English* Maid has more difficulties in it; however I believe the main matter of fact to be true, for all the circumstances can hardly be so. That is, her fast was really so long as 'tis reported, tho nothing near so strict and rigorous as that of the *Dutch* Maid: But the juice of some Raisins and stew'd Prunes, a drop of Claret Wine or Milk, and some such little things, that would scarce be able to keep a Chicken, were reckon'd for nothing, either out of pity or admiration: And therefore, setting bewitching aside, what origin soever her distemper may have had, I believe that the next cause of her long fasting was a viscous matter, and the stopping of the transpiration-pores, not only because of some light resemblance betwixt the two *Phenomena*, but especially, because 'tis observed that she eat all sorts of things, that is, they gave her fat Meat, or full of gravy; good thick and fat Broth, strong Beer, and the like, which are as apt to create Viscosities in a weak Stomach, as any raw fruits. If her fasting lasted longer than that of the *Dutch* Maid, it is because the nourishment she took, tho in a very small quantity, hindered the clammy humour from being so quickly consum'd.

But because I perceive that Gentlemen are divided in their opinions of this Maid, I shall set down a *Criterion*, or a mark, by which the truth may, methinks, infallibly be known. She began to be sick at eleven years of age, and continu'd so till about 23, after which

women

October, 1693.

323

women do not use to grow. During the 5 years of her fasting, 'tis certain she could not grow at all; neither could she become much taller, during the other 7 years, she was so sorely vex'd with the hickock, blood mix'd with her urine, vomiting, want of sleep, &c. And therefore if she be still about the same stature that she was when eleven years old, there is apparently no cheat in the main. But if she be much taller, we have reason to suspect the worst.

The grand objection that can be made against those conjectures, is how a man can live, the pores of his transpiration being stopp'd. To which I answer, that they have been so for the most part, perhaps in all those who make the objection, and that too for a considerable while, and as oft as they had catcht a great Cold or Rheum, that made 'em lose their Stomach. For the Rheum does not always proceed from abundance of humours, otherwise every ordinary Physic or Sudorific would cure us of it. But it arises from a viscous matter, that mixes with the Chyle and Blood, and partly stops the pores of the transpiration; which stopping, if it come to be encreas'd from without by the thickness and intemperance of the air, the superfluous humours that were to be exhal'd by the transpiration, mix again with the Chyle and Blood; and then nature, or that power which God has given to our bodies, to restore themselves into their former state to a certain degree, endeavours to expel those humours through the lungs and nostrils with violent efforts of the breast and brain.

It's vulgarly imagin'd that the transpiring and sweating pores are all one, but this I dare aver to be an error. 1. We may easily procure sweating when we have got the heaviest cold, but that will rather endanger us than allay the disease, either because sweating does not dilute the viscous matters that are the original cause of the Rheum, or that we transpire through other pores, besides those of the sweat. 2. Tho we sweat, yet the pores of our nostrils, through which we have the sensation of odors, and those of the orifice of the stomach, through which the sensation of hunger and thirst is communicated to the brain, remain quite or almost stopp'd. We are only aware of the stopping of those two parts, but who can tell that many others are not so? Especially seeing that out of the stopp'd nostrils flow abundance of humours. 3. If the pores of the transpiration and those of the sweat were the same, we ought to eat more in Summer than in Winter, in hot than in cold weather; whereas 'tis just, when the cool East and North winds blow, that we have a better stomach. 4. Tho we have stools and urine as much and sometimes more than ordinary, when we are troubled

with Rheum, yet the humors of which nature does discharge it self, amount to a far greater quantity than those of the other excrements. 5. We imagine that a Physick, which does strongly operate, rids us of a great many superfluous humors; but 'tis a mistake, for it only brings down the humours that were ready to transpire; however it may happen to cure us by carrying away such humours as were too thick and clammy, to be transpired. 6. Such a plenitude of humours, as is cast out by the Rheum or a strong Physick, would suffocate and kill the strongest man in the world within three days; and therefore this plenitude is the effect, and not the cause of the Rheum, and is made up immediately of the matters that were to be transpired.

Thence I conclude, that since the pores of the transpiration can be stopp'd, and that neither the time nor the degree of that stopping is determin'd, they can have been so in the two Maids above-mention'd, and that too for a longer time than we are apt to believe, and that therefore the main of their story may be true.

October 28.

L E T.

October, 1693.

325

LETTER XLII.

To the Reverend Mr. *William Hart*,
Rector of *Walpoole* in *Marshland*.

ARGUMENT.

Why Marshland breeds no Rats. Description of that Country, and the Isle of Ely. Of the nature and various species of Rats. That the vapours of the stagnating Waters, and the steams of the Soyl are the cause that they cannot abide there. What sort of exhalations those are. Why other Animals do notwithstanding thrive in that Country. What sorts of Talismans are effectual? Farther proofs of the matter of Fact.

Reverend Sir,

I Never doubted of the matter of fact, over which you did me the honour to ask my opinion, namely, that *your Country breeds no Rats*, and if they come accidentally by goods brought into it, they presently languish and dye, without any visible cause for it. A man in your station, who writes with so much sense and judgment, and has been often an eye-witness of what he relates, is not to be questioned in a simple matter of fact. And therefore I would have ere now answer'd your obliging Letter, were it not that I wanted *Camden's Britannia*; and that in my present circumstances, I cannot always find a Book so rare, and of so great a price.

Now having recover'd it, I shall set down, as the foundation of my answer, what that learned man says of the Soyl of your Country (a).

Over against Linne, on the farther side of the River (Ouse) lies Marshland, a little moist, marshy Country, as the name implies, divided and
parted

(a) *Camd.*
Brit. Lond.

Fol. 1610.

P. 481.

parted every where with Ditches, Trenches and Furrows, to drain and draw the Waters away. A soyl standing upon a very rich and fertile mould, and breeding abundance of Cattel; so that in a place call'd Tilney-smeth, there feed much about 30000 Sheep; but so subject to the beating and overflowing of the roaring main Sea, which very often breaks, tears and troubles it so grievously, that it can hardly be kept off with chargeable walls and works.

He gives a character very approaching of the Isle of Ely, which is adjacent to Marshland, in these words, p. 241. The farther and Northern part, because it is fennish ground, by reason of the many floods that the Rivers cause, and so dispers'd into Islands, is called the Isle of Ely, a tract extraordinary green, fresh and gay, by reason of most plenteous pastures; however in some sort hollow, because of the waters that in some places secretly enters in, and even when it overflows, surrounds most part of it.

And p. 491. The whole Country in Winter, and sometimes most part of the Year, is overflown by the Rivers Ouse, Grant, Nen, Welland, Glene and Witham, having not loades and sewers large enough to discharge themselves. But when the streams are retired within their own Channels, it is so plenteous and rank of a certain fat, gross and ful hay, which they call lid, that when they have mowen down, as much as will serve their turns, they set fire on the rest, and burn it in November, that it may come up again in greater abundance.

That such a fennish Country cannot be very wholesom is a plain consequence in Physick, which agrees too well, as you know, with the experience of Strangers, that is, of all such who are not born and bred there. And that it has been so ever since it was inhabited, appears by one *Fælix* a Writer of good antiquity; which seems to comprehend your *Marshland*, in the description he makes of those Fens.

His words are thus quoted by my Author. There is a Fen of exceeding largeness, which beginning at the banks of the River Grant, arising some where with sedg-plots, in other places with black waters yielding a duskyish vapour, &c.

The very Fishes, which these Waters breed, are sickly, if we believe *William*, a Monk of Crowland.

Gurgite tetro

Morbosos pisces vegetans.

The next thing I have to do is to inquire into the nature and various species of Rats, as far as is material to the question in hand.

We use to confound Mice and Rats in the common language; tho they are two different species. The former are gray, small and

wea,

weak, and breed so prodigiously that *Aristotle* relates a Mouse included in a Vessel with Millet brought forth 120 little ones. And I remember to have read somewhere, that in 1648, an incredible number of Mice overflow'd the County of *Essex*, and would have wasted all, but that there came soon after great quantities of Owls, which rid the Country of it. They use to gnaw dry bread, ends of candle, and if they find nothing else, papers and goods. Rats are browner, bigger and stronger, and sometimes make bold to defend themselves against Cats, especially by troops, tho' the fight proves, for the most part, very unequal, and ends with the rout and slaughter of the Rats. They are both a very dainty bit, which is the cause of the Cats taking so much pains to hunt after them, even when they disdain other meat. And to this purpose I remember a story, that I was told by a worthy Gentleman in *Holland*: A neighbour of his had a Child of 4 or 5 years of age, who, notwithstanding all the trouble she took, could not be taught to ask when he would go to stool. She observing that his excrements were extraordinarily dilute, suspected at last that it came out of weakness, and went to a Physician for counsel, who advised her to feed him with broil'd Mice and young Rats, adding that she ought not to be afraid of it, and that having cut off their head and tail, she might freely give them to him under the notion of Birds. She did it, the Child eat greedily the supposed Birds, long'd often for them, and was cur'd within a fortnight. In *Provence*, I have my self eaten Mountain or Field-rats, which in Autumn are extraordinary fat and tender, and go there for excellent meat, being not at all venomous. The Inhabitants use to hunt them with Fire arms, under Walnut Trees, upon which these Animals use to climb to eat the Nuts. I have also read of Water-rats, which sculk on the sides of Ponds and Rivers, and feed upon the Fish; but I never saw any of them, and by the description of Authors it appears, that they do not frequent *blackish waters, yielding a dusky vapor, and whose Fishes are sickly*. As to the Mice and Rats that infest our Houses, it seems that they care not to drink, unless they be poyson'd.

Thence I conclude that the most probable cause, why Mice and Rats cannot abide your Country, are the moist unwholsom vapours, which are continually steam'd out of it.

I joyn moist and unwholsome together, because the vapours of running Rivers, and those that form dew and rain, are healthful to many Animals, especially at certain times; whereas I know not of any, unless it be Toads and Frogs, and a few Fishes, that can endure the noisom smell of stagnating Waters. It would be a piece of presumption

in

in a Stranger, that never liv'd in *Marshland*, to determine precisely wherein that unwholsomeness does consist. Waters that overflow a Country carry several heterogeneous matters with them, which when they stagnate undergo various fermentations. And that the fermentations they suffer in *Marshland* and the Isle of *Ely*, are not very conducive to health, appears by the *blackish colour* of those waters, the *dusky vapours* they yield, and the *fore effect* they produce upon *fishes*, which apparently hinder them to transpire as well as the Rats, whose pores are far thinner. For if you anoint a Fly, a Worm, or any other weak Insect, all over with Oyl, it will dye in a short time, for want of transpiration: Since no other hurt can be imagin'd to proceed from such a sweet and harmless substance as Oyl, than that it stops the pores by its intricate and branched particles. Besides that, your Soyl may be pregnant with saltish, acrimonious, nitrous and sulphureous fossiles, that perpetually emit steams of the same nature; but on the other side render it wondrously fertile. I am the more inclin'd to this conjecture, that in the Southern parts of *France*, when Husband men will rid their Corn fields of Moles, a sort of Vermin not very different from Rats, they make upon them little Ovens, with Sodds and Wood under them, at 15 or 20 paces from each other, give time to the Sun to dry them, then put fire to the Wood, which burns the Sodds to a black Powder, that being spread on the surface of the field, makes it fruitful, and frees it from Moles, at least for a year. It may be imagin'd that the smoak of the burning Earth choaks those Animals; but 'tis more probable that either that smell, or the saltish particles of the burnt Sodds, mixing with the ground by reason of the Rain, make them run away.

If it be ask'd how other Animals can then live in *Marshland*? I answer. 1. Because they are of a stronger constitution than Mice and Rats, that are very weak creatures, as appears from their frightfulness and the tenderness of their flesh, two infallible tokens of the weakness of Animals. 2. Because the steams of your Country may be poysonous for them and not for others, as pounded Glass, mixt with Grease, or any other meat that those Insects love, will kill them, and not produce that effect upon other Animals.

I know that Ships are often much infested with that Vermin, but Ships are very dry places, and the air of the Sea, especially the Main Ocean, is so far from being unwholsome, that it must be more healthful than that of the firm Land. For where is the Citizen or Countryman that could stand out as many hardships as Seamen undergo, Winds, Tempests, perpetual Agitations, Changes of Climate,

Climate, and then to feed upon nothing but Salt Meat for many months together.

As to those Gentlemen, who, as you say, ascribe that privation of Mice and Rats to *Talismans*, I will yield something to their opinion, when they can find out the place where these *Talismans* are buried, and having extracted some of 'em, let us see that they are of make fit to replenish the whole Country with steams, during many ages

If so be, that Rats cannot thrive in the Isle of *Ely*, no more than in *Marshland*, I have very near lighted on the true cause of it. Just now I spake with Mr. *Box*, a worthy Gentleman, that has an estate in your Country, and with several others that have been in both places. They all assure me they never saw any Mice or Rats in *Marshland*, or the Isle of *Ely*; but could not tell whether or no they can abide there. In the mean while Mr. *Box* gave me such a character of your parts and sincerity, that any one may depend upon the matter of fact.

F I N I S.

The CONTENTS.

- Letter XL. *A Demonstration of the truth of the Christian Religion, without supposing any miracles.* 297
 Letter XLI. *Of Natural and Miraculous Fasts, with considerations on two Women that are said to have fasted, one 5 years, and the other 8 months.* 311
 Letter XLII. *Why Rats cannot thrive in Marshland.* 325

ADVERTISEMENT.

TH O I do not use to give *Advertisements* of Books, yet my Booksellers have lately printed such a useful one, that I thought fit to recommend it to those that love truth and piety. It is intituled, *An Antidote against careless indifferency in Matters of Religion, or a Treatise in opposition to those that believe that all Religions are indifferent, and that it imports not what men believe: With an Introduction by Antony Horneck, D.D. Chaplain in ordinary to their Majesties, 12. London for H. Rhodes. and J. Harris, 1694.*

Gentlemen may continue to direct their Letters to my Lodgings at Mr. Fage's a Turner, in Playhouse yard, near the Thistle and Crown, in Blackfriars,

MEMOIRS FOR THE INGENIOUS.

CONTAINING
Several Curious Observations in *Philosophy,*
Mathematicks, Physick, History, Philology, and
other Arts and Sciences.

IN
Miscellaneous Letters.

By J. DE LA CROSE, Eccl. Angl. Presb.

NOVEMBER, 1693.

To be continued Monthly.

VOL. I.

*Quidquid facies, citò redi à corpore ad animum : hunc diebus ac nocti-
bus exerce : Labore modico alitur illud. Hanc exercitationem non
frigus, non æstus impedit, ne senectus quidem. Id bonum cura, quod
væstate fit melius. Seneca Epist. 15. ad Lucilium.*

LONDON, Printed for W. Rhodes at the Star, the Corner of
Bride-lane in Fleet-street. And for A. Harris at the Harrow in
the Poultry. 1693.

Where are to be had the Memoirs for *January, February, March,*
April, May, June, July, August, September, and *October.*

MEMOIRS

FOR THE

INGENIOUS

CONTAINING

Several Curious Observations in Philosophy,
Mathematics, Natural History, and
other Arts and Sciences.

IN

Miscellaneous Letters.

OF THE AUTHOR, Esq. F.R.S.

LONDON, 1723.

To be continued Quarterly.

VOL. I.

Printed by J. Sturges, at the Sign of the Anchor, in St. Dunstons Church-yard, near the North Gate, in the Strand.

TO BE CONTINUED QUARTERLY, IN THE SECOND PART OF THE SECOND VOLUME, IN THE YEAR 1724.

Printed by J. Sturges, at the Sign of the Anchor, in St. Dunstons Church-yard, near the North Gate, in the Strand.

Memoirs for the Ingenious.

NOVEMBER, 1693.

LETTER XLIII.

To the Right Reverend Father in God
William, Lord Bishop of *Litchfield* and
Coventry, Lord Almoner to Their
Majesties.

A R G U M E N T.

The Author's design in writing these Memoirs, and what means he has to perform it. Occasion and Subject of this Letter: Whether Nebuchadnezzar was transmuted into an Ox? That the Transformation was not real, but only a Madness. Such Metamorphoses prov'd impossible. Idea's and Perceptions are independent from the Soul. What the Senses contribute to them. The strongest Objection against the Immortality of the Soul answer'd at large. Seven Axioms laid down. The state of the Soul in a sound Sleep, in Swoons, in Drunkenness. Remarkable qualities of some Drinkers. Of Madness. That the Soul of a Madman acts more rationally to follow the appetites of her disturb'd Body, than if she did conform her self to a compos'd state. Of Virgins and Womens Longings. Why we see Bodies with such or such Proportions? An Argument by the By against the Indifferency of Religions.

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Religions. Instances drawn from the Holy Writ, Judg. vii. 2 Kings iii. 22, 23. vi. 15---23. vii. 6, 7. The Transmutation of Nebuchadnezzar prov'd not real by the Sacred Text. The sense of the word Tedar. What kind of Dreams and Madness can be remembred. Of the Daughters of Proetus.

My Lord,

THere was never a time, where I stood in need of your learn'd Conversation as much as I now do, nor ever any, where I had less opportunity to enjoy it. For I am hurried away with business, and that too with so little respite, that a Mile or two keeps me at a distance from the persons for whom I have the greatest veneration. In the meanwhile several Gentlemen, who judge of my Learning by such a bold Attempt, as the writing of *Memoirs for the Ingenious*, propose to me difficult Questions in all sorts of Sciences, as tho' I were a living Library, or had an *Encyclopædia* in my head. They may remember (a) that my first design was to translate the *Physical and Mathematical Memoirs of Paris*, and some Observations out of the *Journal des Savans*, if at any time the Learn'd of this Kingdom should not supply me with a sufficient number of Papers to fill up a monthly Book. But either by neglect or misfortune, I could get but one of the *French Memoirs*, since August 1692, the *Journal des Savans* has few things besides Abstracts; and the Ingenious of this Country send me Objections and Problems, instead of Experiments and Dissertations. In such hard circumstances, there is little likelihood, that I can continue longer than this year.

(a) See
Lett. 1. p. 3.

The only comfort I have is, that this way of writing Letters, affords me an occasion to court the friendship of the Learn'd, and to return publick Thanks to those that have not despis'd a Foreigner, who had no other Friends or Recommendation but his Pen. Your Lordship being one of the first, who has giv'n me sensible marks of his affection, I ought not to have been so backward in shewing my acknowledgment: But what could I offer to the celebrated Doctor Lloyd, that was not too trivial for him, tho' I should penetrate into the innermost recesses of Antiquity, both Sacred and Prophane, unfold the most intricate difficulties of *Chronology*, and explain the most puzzling passages of the Holy Writ, of the ancient Fathers, and other Greek and Latin Authors? But I am not like ever to attain to such a high degree of knowledge; for *Chronology*, *History*, and *Philology*, are not complicated Lines, Numbers or Idea's, which can be disentangled,

intangled, and put into a clear and methodical order by meditation; but they consist of matters of Fact, that require an universal reading, and such a vast and compleat Library, as is far beyond my Means, and, perhaps, those of any private Man. However, after many deliberations, chusing rather to be thought presumptuous, than to be accus'd of Ungratefulness, I humbly present your Lordship with some thoughts concerning one of the chief Objections against the *Immortality of the Soul*.

A Gentleman, who does not subscribe his Name, asks my Answer to some Difficulties he finds in the supposed transmutation of *Nebuchadnezzar*: 'This Transmutation, *says he*, was either real, or only a madness, some such distemper as that which the Physicians call *Lycanthropia*; wherein the affected persons fancying to be turn'd into Wolves, become as cruel and dangerous to Men as those murdering Beasts, if they be not secur'd. Granting that the Transmutation was real, you must own withal, that the rational Soul can be annihilated; or what is all one, that it can be reduc'd to the lowest Species of Spirits, if Beasts have any sort of thoughts. Neither will it serve your turn to have recourse to raving Diseases; for what does it help a mad Man to be endued with Reason, if he be not conscious of it? What were the thoughts of that frantick Emperour, during those seven years, that *he ate grass as Oxen, his hairs grew like Eagles feathers, and his nails like Birds claws*? Dan. iv. 32, 33. Did his rational Faculty sleep so long? If not, what weakned on a sudden that magnanimous Soul, who could head numerous Armies, and rule so many and so large Kingdoms?

This is the short of my anonymous Adversary's Objections, which I do not dissemble in the least. I answer then, That the Transmutation was not real, but only a Madness: Because such a Transmutation is impossible; not out of any defect of power in God, for all the Creatures would be annihilated, if he only ceas'd to will their existence; but by reason that the most perfect Being cannot alter his Will, or be liable to Inconstancy, which proceeds from want of fore-knowledge; he shall never cease to will the existence of his Creatures, and therefore they shall never cease to subsist.

This is the chief natural ground of the Immortality of my Soul: for I am conscious to my self, that my Soul and my Body are two distinct Substances, since notwithstanding their strict union in this life, they act independently from each other in several occasions. For instance, my Soul (I understand by this word the principle of my thoughts) contributes nothing to the digestion of the Aliments, and divers other mechanick actions of the Body: and the Body is but a

remote, and not an immediate cause of most of the speculative Notions and Operations of my Soul. I grant that the Senses are the occasional cause of most of my Sensations and Idea's. I should not have the Idea of a Tree, had I never seen nor heard of it, but having once gotten it, all the Trees in the World might be annihilated, and my own Eyes and Ears too, that I should not cease to have it. The Reason of it is, that neither the Senses nor the Soul are the Creators, if I may use that expression, of those Idea's, but the Senses are only as so many Windows, through which the Soul receives or contemplates that spiritual light, which subsists, from all Eternity, in the infinite Wisdom, the Creator of the World, and the supreme reason of all Intelligences, who communicates it to finite and subordinate Spirits, according to the different reach of their Capacities.

But against this it may be urg'd, That the Soul cannot act without animal or vital Spirits, some very minute particles of blood, which by their striking the *fibres* and nerves of our brain, or running through them, arise or occasion our perceptions and thoughts. That the Soul cannot act without these Particles, they endeavor to prove thus: If she could act without 'em, certainly she would, since according to us, her very essence consists in thinking; and if she should act, we should be conscious of her operations: but we are not conscious of the operations of the Soul, in a sound Sleep, in a Swoon, in Drunkenness, Madness, &c. And therefore the Soul does not then act, being destitute of vital Spirits, or because those unruly Corpuscles will not obey her orders. Whence they infer, That the Soul depends upon the Body in all her operations, and that when she shall be separated from it, she shall lie in a sort of inactivity and silence, or have no other existence than that of an insensible Atom, till by some other happy revolution she chances to be united to another body. This is the short of whatever *Hobbs*, L——, the *Socinians*, a late Author, under a *Mahometan* disguise, could offer more rational against the Immortality of the Soul. So that if I can clear this Objection, I may boast to have run down those enemies of Mankind and themselves.

In answer to it, I say that this Sophism is a continual *series* of false or equivocal Suppositions, which I shall make appear by supposing nothing but what is plain and uncontestable by our own experience. 1. It cannot be deny'd, that there are confus'd and distinct Perceptions. 2. That we remember easier clearer, than intricate Notions. 3. That simple or separate Idea's, tho never so distinct, cannot be remembred long: but that to be retain'd a considerable time,

time, they must be many in number, concatenated together in a very methodical order, aiming all at the same scope, and making up what we call an Argument, a Discourse, or a Dissertation. 4. Separate Idea's, as the particular objects of our Senses, the words of several Languages, &c. can be engraven on the memory, but 'tis only by the repeated strokes and frequent course of the vital Spirits within some certain nerves of the brain, in which they dig a free passage, and through which afterwards they become apt to run, as through a broad, deep and declining Channel. 5. Confus'd Notions proceed from different objects, making each together, and at the same time, their respective impressions upon the brain; so that when these impressions are equally strong, they cannot affect the *Oval Center*, or whatever other place is the seat of the Soul, so as to rise any distinct Perception: even as Needles could not pierce a Bladder, if their sharp ends cover'd its whole surface, so as to leave no empty place, where the skin press'd down by each Needle could spring up again. 6. In this state of Mortality, 'tis neither the Soul nor the Body alone that are the Man, but Soul and Body united together constitute our Being. This is the cause that we are not sensible of many operations which the Body performs alone; and, on the contrary, that we are not aware of those thoughts which the Soul has by her self during a sound Sleep, a Swoon, Fits of Drunkenness, and Madness, when they are past, &c. 7. As the Soul is the nobler part of our selves, and that which is to remain entire after death, so it has been made to rule the motions of the Body, and would still keep the command in all necessary occasions, had she not suffer'd her self to be seduced so far by passions and corporeal pleasures, as to let the vital Spirits become unruly, and their motions irregular. A plain proof of this is, that tho in this general depravation of humane nature, not one Man hath kept an absolute command over the motions of his Body, yet those who endeavor so to do, who mind more the perfection of their Soul, than the satisfaction of their Body, spiritual than corporeal enjoyments, get sometimes more clear Perceptions in one day, than the others in one month, and, I dare say, in the whole course of their Lives.

By these few and undeniable Propositions, I hope to clear all the Doubts.

I. Tho we are not sensible of the operations of the Soul during a sound Sleep, it follows not that she does not think, but only that the vital Spirits, striking weakly, but equally, and on all sides the seat of the Soul, hinder mutually each other's impressions, so that there cannot arise from thence any distinct Notions, to be perceiv'd
and.

and remember'd by the *whole Man*, according to the second, fifth and sixth *Propositions*. We know, by self-experience, that a Spirit can be aware of the motions of Bodies; but we know not that a Spirit having lost its thinking faculty can recover it by any corporeal motion whatsoever; and 'tis but just, that the objectors should supply us with some instances of the like nature, before we can adopt such strange conceits.

But as an overplus I shall add some probable reasons, which increase my persuasion of the Soul not ceasing to think, even in the deepest sleep. First, There is nothing more common than to dream, and not to remember our dreams. Nay, those confus'd dreams leave sometimes such extraordinary footsteps behind them, that had we the power of *Nebuchadnezzar*, perhaps we would gather as many Astrologers as he did, to find out what they were. Secondly, It is likewise not unusual to dream, that we dream not; for it oft happens that the Soul is conscious to her self her body lies in a sleep, and being displeas'd with that confinement, because she would contemplate some Ideas wherewith she is taken up, she forces the vital Spirits, that have remain'd about her, to move through the fibres and nerves, which are fit to represent those Ideas, and that with such a quick and lively motion, that she is apt to infer her body is awake, and not sleeping. Thirdly, Those, who are healthful and us'd to command their passions and the motions of their body, may oft wake themselves at what hour of the night they please, if they are firmly resolv'd to do it, for some important occasion. Now, considering that we can break our sleep meerly by our will, but never procure it by that faculty alone, what other reason of this difference can be contriv'd besides this; that Sleep is a calm and quiet state of the Body, which the Soul alone cannot produce in it, because Spirits cannot act upon bodies without the help of other bodies; whereas she can disturb that tranquility almost whenever she lists, because she never rests her self, but only allows quietness to the body for its refreshment, and that it may be better able to perform her commands.

II. One may argue in the same manner of Swoons, as we have done of sleep, allowing that a disease puts the Soul in a greater incapacity to command the vital Spirits than weariness does. I know many stories concerning this subject, but because I have none whose credibility I can averr, and I want self-experience, God having preserv'd me hitherto from such accidents, I proceed to another head.

III. As to Drunkenness, I lack again self-experience; for an uncivil company, by forcing strong liquors upon me, would rather kill me

me than make me drunken, that is, disturb my Reason so far as to make me talk nonsense, discover the secrets of my friends, do unbecoming actions, and the like. But instances of this kind are so common, that I have had occasion enough to make observations upon them. 1. There are men so wary that knowing, they shall meet with a company, where plentiful Cups will be drunk, and where 'tis not safe for them to talk their mind freely, desire some of their friends to come thither sober, and to pull them by the sleeve, if at any time they went about to discover themselves. It has been done accordingly, and observ'd that by this motion, which was so insensible, as scarce to be perceiv'd by the rest of the company, they became mute in a moment, and could not be made to speak upon that subject afterwards. This shews the great power of the Soul, even in that intoxication and universal sedition of the vital Spirits, that she should still keep so much force, as to stop their unruly motion in an instant, whenever she is made aware, that it will prove dangerous to her well-being. 2. The most part of Drunkards are not so prudent; however there are few, who drink to that excess as to be incapable to pay their reckoning, and to go staggering home; which shews again, that the Soul is not so quite depriv'd of her Empire, as not to be able to preserve a man from utter destruction. 3. I have seen others, who knowing the Proverb, *In vino veritas*, fuddled themselves on purpose, to speak more freely the truth of those whom they hated or lov'd. I was amazed at it, and suspecting some cheat, I examined closely these men, but perceived so many uncounterfeited signs of drunkenness, as wild looks, a red face, a stammering speech, senseless discourses, a discompos'd countenance, wavering steps and the like, that I gave over my suspicions, and concluded that the Soul comes never entirely to lose the power she has over the body, as long as its organs are fit for life and action. The reason of it is plain in this instance, since in pursuance of a former resolution, which she remembers still at the presence of those whom she will affront or commend, notwithstanding the present intoxication, she can move the unruly spirits through the fibres and nerves of the brain and tongue, that are fit to utter such and such discourses. And tho such things may happen undesignedly, yet the power of the Soul is not much less; for this proves still, that even in that disturbance of her body, she may discern her friends from her foes, and find out means to fawn the former, as well as to be revenged from the latter.

IV. There are so many sorts of madness, that it would require a large Volume to treat of them all; but that of *Nebuchadnezzar* being the highest

highest degree, if I can explain this strange Phænomenon, and shew that the Soul acts rationally, that is to say, consequently or conformably to her perceptions, even in a man who imagines himself to be a beast, none may say any more, that she lies then in a state of inactivity and silence.

First of all I would fain ask my Adversaries, why they grant a low degree of reason to beasts (none of 'em for ought I know being a *Cartesian* in this point) and deny it to such a Madman. For, their opinion is only grounded upon this, that beasts by a natural instinct, which they call an inferior sort of knowledge, seek what is proper for the preservation of their being and well being. So did likewise our frantick Emperor, for he did not foolishly starve himself, but not relishing the meat and drink of men, nor being able to speak as they do, away he ran into the fields, there to eat grass with his new Comrades the Oxen, to bellow with them, and to walk fourfooted as they do. Had he remained in his Palace, he had proceeded irrationally, for he had exposed himself to an infallible death, either out of hunger, sorrow or weariness.

Thence I infer, that a Madman, who proceeds according to his false perceptions, acts more wisely, than if he did proceed as a healthy, sober and well composed man. This will be taken for a jest or paradox by some pretenders to Wit and Learning; but I never writ so disingenuously, or in a style so unbecoming a Christian and my Profession. I speak the true sense of my mind, and even hope to make my assertions sensible to the meanest capacity, before I have done with 'em.

Every one is acquainted with the strange longings of Women, and of those unlucky Virgins, who are troubled with the Jaundice. The longings of the former are so strong, that they will endanger the Mother and the Child, if they be not speedily satisfied; or the Child at least will bear all his life a mark of the distemper of its Mother. As to the latter, tho their modesty often hinders them from shewing their weakness, yet they cannot forbear eating privately Plaister, Ashes and the like, and to keep 'em from it is the right way to kill them; for these insipid things are strong *Alcalis*, that temper the excessive acid of their stomach.

It goes even so with Madmen. *Nebuchadnezzar*, saw, heard and relished things like an Ox; he bellowed and had the same longings with those beasts; and therefore his Soul, who aimed at the preservation of the whole Compound, acted rationally or conformably to her false perceptions, to carry him over into the fields, there to feed with those beasts; and to proceed otherwise was to expose the man to a certain death.

Let's

Let's suppose some men born and brought up in a Tower built in the middle of a Plain, near the High-road, amongst Towns, Villages, Castles, Trees, Gardens, Cornfields, Meadows, Vines, Rivers, Hills, Forests, and whatever can divert the sight. Let's suppose again that these men never stir'd abroad, nor had communication with any man living, but with one another; that the Windows of their Prison cannot be open'd nor broker, tho they be made up of a transparent matter like our magnifying Glasses, which increases the objects to the double, triple, or quadruple of what we mean to be their natural bulk; so that these men never saw any visible thing, nor even themselves, in the same proportion we would have seen them. I ask whether it be possible, that these Prisoners should have the same Ideas of bodies with us? No certainly, for the senses, the windows of the Ideas, are different: So that if they came to draw inferences like ours, it would be by some false and unaccountable supposition; for a Spirit ought to judge by his natural, perpetual or constant perceptions, otherwise he will certainly mistake. And I am apt to think, that the Eyes of a Mite represent to that animal an insensible corpuscle as big as our own do an Elephant to us.

Your Lordship sees that this is the case of Madmen, and that their Soul acts rationally, when she proceeds according to her false judgments, since the only cause of her mistakes is the false relations of the senses, her judgments being otherwise consequent and reasonable. If it be objected that the Soul of *Nebuchadnezzar* might have remembred, that she animated a great Emperor, whom it became not to run naked into the Fields, and feed there with Oxen. I answer, that she might remember all that, without being able to help it, because the constitution of her body was so alter'd, that it relish'd no other diet, exercise or diversion, but such as please those Beasts, and therefore it must have it or dye.

Our Adversaries believe, that *an invincible ignorance* disculps; which is true, tho the consequences they draw from thence are not so; viz. that an erroneous conscience lies in an invincible ignorance, because every one is firmly perswaded, that what he believes is the truth; and therefore that all Religions are indifferent. But no ignorance may be called invincible, besides such as proceeds from the false relations of the senses, whereas the ignorance of those, who err in the fundamental Articles of natural and reveal'd Religion, comes only from prejudices, laziness, distractions and the like. Every rational Creature may find out that there is but one eternal and supreme Being, and every Christian may easily know that there is but one

Mediator betwixt God and man, and therefore Idolaters and Papists are inexcusable. In the mean while I infer that since madness is a distemper of the body, being grounded upon the false relations of the senses; the Soul in that state of invincible ignorance cannot be accus'd of irrationality, as long as she judges and acts according to her perceptions.

Even in morals, we do not use to call that man Imprudent, or a Fool, who has dealt with all the possible circumspection, be the success never so unhappy. Were the *Midianites* Fools, when they fled before the 300 men of *Gideon*, *Judg.* VII. No, but they were perswaded that the God of the *Israelites* was a powerful Spirit, who had performed wonderful feats in *Egypt*, and that when he would take the part of that people, there was no fighting against them. The stratagem of *Gideon*, his blowing of Trumpets in the middle of the night, with the shewing of kindled Lamps within broken Pitchers, and the sudden clamours of his small Army, frightened them at that rate, that they imagin'd that powerful Spirit, Favourer of their Enemies, had brought down all the Angels of Heaven to kill them, and consequently to their panick terrors, endeavour'd to save their life by a swift flight. Thus the *Moabites* seeing the River, behind which the *Israelites* were encamp'd, as red as blood, because of the Sun shining upon it in the morning, concluded too rashly that *Judah* and the ten Tribes had fought together, and destroyed one another; and full of that deceiving confidence ran disorderly to their Camp, as to a place of prey, *2 Kings*, iii. 22, 23: The fears of *Elisha's* Servant, when a strong detachment of the *Syrian's* Army had surrounded his Master and him, in the little Town of *Dotham*, were more reasonable; but he grew calm in a moment, when God open'd his Eyes, and he saw the mountain full of Horses and Chariots of fire, round about the Prophet. And tho it be probable that *Benhadad* had given to the General Officers of that Detachment the Picture of *Elisha*, and the Draught of *Dotham*, so that they could not but discern them from any other man and place, and that nevertheless they suffered themselves to be led into *Samaria*, and delivered into the hands of *Joram* King of *Israel*, by the Prophet: yet no body did ever call their mistake a folly, because it proceeded from an invincible ignorance; they were smitten with blindness, says the H. Writ, that is, the Rays of light were so reflected to their Eyes, that they could not know *Elisha*, nor the place where they were, *2 Kings* vi. 13--23.

I could quote many instances of the like nature, as the mistake of *Judas*, the *Jews* and *Roman* Soldiers, who came to seize on our Saviour

viour, *John* xviii. 4--7. The *Syrians* raising the Siege of *Samaria*, upon a suppos'd noise of *Chariots, Horses, and a great Host* that march'd to its relief, *2 Kings* vii. 6, 7. But these will suffice to conclude, that since we use not to say of those that are mistaken by an invincible ignorance, or even in a conclusion drawn from probable grounds, that they have lost their Reason; so we ought not to esteem the Soul of Madmen a stupid and insensible thing, forasmuch as she draws Inferences, which, considering the present state of her Body, especially the false relations of her senses, are almost as just as those that she formed before.

It remains only that I should shew, that the expressions of the Sacred History agree with my Metaphysical Notions, or that it appears by the Text, that the change of *Nebuchadnezzar* was not a real Transmutation, but only a Madness. The Sentence pronounc'd by an Angel during that Emperor's Dream, begins thus: *Hew the Tree down and destroy it, yet leave the stump of the roots thereof in the earth.* The Prophet tells us, that the King himself was that strong and flourishing Tree, and therefore its Body was his own natural Body; its Branches, in a moral sense, his Family, Attendants and Courtiers; its Leaves and Flowers, his Riches and Greatness. All this was fell'd down and destroy'd, however not so as to be burn'd, or turn'd into another substance; but so as to lie on the ground *amidst the grass, to be wet with the dew of heaven, and to have his portion with the beasts of the field*; not for an undetermin'd time, but till seven times, or years, had pass'd over him, *Dan.* iv. 23. And therefore the *stump of the Tree-roots* signifies in the physical sense the *rational Soul*, that constitutes the essence of a Man, and distinguishes him from a Beast, as it does his reinstallation upon the Throne in the political signification, *ver.* 27. For both were left *in the earth*, tho the former was fetter'd with a band of iron and brass, that is, darken'd and troubled with the sensations and affections of a Beast.

It may be objected, That I have suppos'd all along, that our frantick Emperor ran away into the fields, of his own motion, whereas 'tis said, *they shall drive thee from men*, which seems to include a violent expulsion. Knowing the veneration that the Eastern Nations have for their Kings, I humbly conceive that when his mad Fits began, all his Court star'd at 'em; he was shut up in his Palace, and Physicians were immediately call'd; who could find no remedy for his disease. But remembering his former Dream with *Daniel's* interpretation, or being told of it, they acknowledg'd the power of Heaven, and advis'd his Attendants, that the only way to

keep their Master alive, was to let him have his will, and to run into the fields to graze with the Beasts; which was done accordingly, and several Herdsmen committed to take care of this precious Ox. It is in this sense that I understand that part of his Sentence, *וּמִן־אֲנָשָׁא לֵךְ טָרַדְוּ Ve min Anasha lac tardin; and they shall drive thee from men*, ver. 32. For I hardly believe that the Chaldaic word *טָרַד Terad*, should import so much as to expel or drive out by force, which our Translation seems to include, I rather take it for a word appropriated to Herdsmen in driving their Cattle before them, especially because *טָרַד Tarad* signifies in Hebrew, *to be laborious, or continually at work*, which is the property of Oxen.

But I must answer an Exception that would run down my whole System, viz. *That Men do not remember what they have done or said in a raging Fever, or Fits of madness.* This Assertion proves not exactly true, for it goes with those distempers as with Dreams. When the course of the vital Spirits is so irregular and confus'd, as to produce no concatenation of Idea's; tho' the Soul be sensible of them at the time of their rise, yet she cannot remember them, according to the

Prop. Pag. her capacity is too limited for it, and she cannot retain such Perceptions, even when we are awake. And therefore ridiculous Gestures, insignificant Actions, incoherent Discourses, made or spoken in Drunkenness, hot Fevers, and Fits of Madness, may and must needs be quickly forgotten. But when the Dream or Madness consists in a series of Perceptions, aiming all at one design, and making up together as a whole Scene of imaginary affairs, they may be easily retain'd, and are likewise commonly so; such is the Madness of those who fancy themselves to be Emperors, Angels, Dead-men, &c.

I need not to prove, that the Madness of *Nebuchadnezzar* was of this last rank; for 'tis plain by the sacred History, that he imagin'd himself to be an Ox, and acted according to his Perceptions, he had a *Beast's heart*, and ate grass with 'em. I have prov'd, that this kind of Madness can be remember'd, and *Nebuchadnezzar* must needs have been very sensible of his own, since it was but to finish on condition of his Repentance, *Till thou know that the most High rules in the Kingdom of Men, and gives it to whomsoever he will*, ver. 25. *At the end of those days I Nebuchadnezzar lift up mine eyes unto heaven, and mine understanding return'd unto me*; that is, the right use of my Reason, who was troubled by that strange distemper.

Tho the mad Symptoms of this Emperor have nothing incredible in them, yet to prevent the impertinent exceptions of some Would-be-wits, it will not be besides the purpose to shew their possibility by other instances. I am apt to believe, that most of the *Metamorphoses* of *Ovid* have been fram'd upon such strange Relations misunderstood, wrested or abus'd. But there is one, wherein the truth of this conjecture does evidently appear, viz. the renown'd distemper of the daughters of *Prætus* King of *Argos*, who liv'd about 2693 of the world, as my Authors say. The Heathen Fables tell us, that these two or three Princesses having presum'd to prefer themselves to the Goddess *Juno*, she turn'd them into Cows. But *Virgil*, more ingenuous and reasonable than the deluding Priests of the Idolaters, gives sufficiently to understand, that it was but a Madness which made those Princesses bellow, run through the Fields, and be afraid of the Plough like Cows.

Prætidæ implerunt falsis mugitibus agros.
 ——— *Quamvis collo timuisset aratrum*
Et sæpe in levi quæsisset cornua fronte.

His ancient and learned Commentator *Servius* calls those Princesses *Lysippe*, *Hipponoe*, and *Cyrianassa*, and adds, that *Melampus* a Physician, Son to *Amythaon*, having obtain'd from *Prætus*, *Cyrianassa* in marriage, with part of his Kingdom for her Portion, he cur'd them all three, by pacifying *Juno* with Sacrifices, and dying [with black *Elleborum*, according to *Pliny*] a Fountain wherein they used to drink. The matter of Fact is so certain, that the whole History was engraven on a Stone near this Fountain, as may be collected from an Epigram extant in *Vitruvius*, l. 8. c. 3. But what need I other Proofs for those contradicting Spirits, than to send them to *Bethlehem-Hospital*, or *aux petites maisons de Paris*, where they will find many *Nebuchadnezzars*, and wherein the least of their deserts is to be secur'd for all their life.

L E T T E R

LETTER XLIV.

To Mr. William Pate.

ARGUMENT.

Several uses of Algebra for the improvement of Natural Parts, of Philosophy, Mathematicks and Mechanicks. Solution of three Algebraical Problems, with their operation set down at large.

S I R,

IF only the Ingenious with whom I am acquainted had been pleas'd to supply me with some Papers, I had not been obliged to apply my self to so many sciences foreign to my profession. I rely'd chiefly upon you for Philosophical and Mathematical entertainments; but hitherto, you have not thought either the publick, or these *Memoirs* worthy of your pains. Do not therefore expect great performances from a young beginner in Mathematicks. I present you with the solution of three Algebraical Problems, because they have puzzled some of my Masters. The two first are taken out of the *Synopsis Algebraica*, printed for the use of the Boys of *Christ's-Hospital*, at the expences of Mr. *Edw. Brewster*, at the *Crane* in *S. Paul's Church-yard*, so that I thought them adapted to my capacity: Whereas it seems, that the Author endeavour'd to find out such questions as appear very easy at the first sight, tho they are difficult at the bottom. As to the rest his method is pretty short and plain.

Perhaps some Readers will censure me for applying my self to a science, which they look upon as an unnecessary curiosity, and much more for presuming to insert the solution of some Algebraical Problems in these *Memoirs*. But I desire them to consider. 1. That this

this Book to answer its Title must be a Miscellany of different Observations. 2. That in indifferent things none ought to set up his own inclinations for the rule and standard of others, since there are Algebraists who care as little for Metaphysicks as some Metaphysicians do for Algebra. 3. That this last Science is as proper and more to raise and enlarge the understanding as any other part of Mathematicks. For it uses us to fix the mobility of our thoughts, to meditate upon one and the same subject a considerable time, and to look and turn it on all sides; a great deal of attention being required to get a right notion of a Problem, in which there are but some few things known, that seem to be foreign to the question, whilst the main point is unknown, and will, I dare say, remain so, to any other besides an experienced Algebraist. These are qualifications so necessary, not to be imposed upon by Sophistry, Authority, Passions and Prejudices, that I believe not great progresses can be made without them in any Science whatsoever. 4. Algebra quickens the imagination and improves the Reasoning faculty, when it teaches us to find out equations, to sever known from unknown things, and to rid our selves by degrees from all the latter, besides one, which being compared to what is known gives a solution or is the Key of the whole Problem. 5. Algebra is the foundation of Arithmetick; for unless it be the four general Rules in entire numbers, which are plain of themselves, I doubt whether ordinary Arithmeticians can demonstrate the other operations they make, as the Golden Rule, the Rules of Progression, of Company, of false position simple and double, the doctrine of Fractions, the extraction of the Square and Cubic root, &c. 6. Algebra is not only the foundation of Arithmetick, but may also give it all the improvements it can possibly receive; as appears by Problems, which Algebraists do daily resolve, tho they are far above the reach of common Arithmeticians, who cannot extract the square-root of an unknown quantity, much less when that quantity is a Cubic, a third, fourth, fifth power, &c. 7. The 2^d, 5th and 6th Books of *Euclid* seem to have been invented by Algebra, they flow so naturally from it; even all the parts of Mathematicks can be demonstrated, and consequently improv'd by its means, and I know of an Algebraical Secret by which the art of fortifications may be carried to a greater perfection, but my love for Mankind is too great to publish such a dangerous invention. 8. Algebra using us to distinguish betwixt questions that are determined and those that are undetermined, I am confident that whatever is knowable both in contiguous and continued quantities can be discovered by an Algebraical method. 9. Algebra is not only useful in Sciences and

and Liberal Arts, but also in Mechanicks, whenever we have occasion to find out the unknown force of Gravity, Motion, Wind, Water, Fire, Springs, &c. 10. A great and sensible use of Algebra, is in abridging Arithmetical Operations, and avoiding those mistakes that are apt to slip, in the reducing of a great number of Fractions, and other long and troublesome Calculations. For because the former numbers vanish, when we substitute others in their room, we may easily forget 'em, the capacity of our Soul being taken up with the mean design.

All this will appear in the following Problem, which is very difficult and almost insoluble, without this use of Letters.

A General commanded an Army, whose Foot was triple to the Horse, there deserted $\frac{1}{12}$ — 120 of the Foot, and $\frac{1}{20}$ \boxplus 120 of the Horse. Then he engag'd in a Battel, and after the Fight, he sent the sick and wounded into Garisons, that together with those that accompany'd them, in order to reinforce the said Garisons, made up $\frac{1}{4}$ of the whole Army; so that he kept but $\frac{3}{8}$ of it with him, the rest being either kill'd or taken Prisoners, to which last number if you add 3000, that Summ will be equal to the $\frac{1}{2}$ of the Foot that he had at the beginning. What was the number of the whole Army, and of each of those parts?

There seem to be seven or eight unknown quantities, tho there is really but one, viz. the whole Army; and those many Fractions that would prove so puzzling, should we go to work by Figures, will help us to find it out, if we make use of Letters. Let's then state rightly the Question, and calling z the whole Army $\frac{3}{4} a$, $\frac{1}{4} b$, $\frac{1}{20} c$, $\frac{1}{12} d$, 120 e , $\frac{3}{8} f$, 3000 g , $\frac{1}{2} k$, we have presently the parts of the Equations $az = \text{Foot}$, $bz = \text{Horse}$, $da z - e = \text{Foot deserted}$, $cb z \boxplus e = \text{Horse deserted}$, $bz = \text{sent into Garison}$, $fz = \text{left behind}$. Now 'tis certain that if you abstract from the whole Army the Horse and the Foot that deserted, with those that were sent into Garison and left behind, the rest will be = kill'd and Prisoners, to which $g = 3000$ being added, gives us the first Equation, viz. $g \boxplus z - da z - cb z - bz - fz = ka z$. Let us now endeavour to sever the unknown from the known quantities: z , whatever it be, is an entire number, of which $abcdfk$ are Fractions, will reduce then z to a Fraction, or put an Unite before it, saying, $g = da z \boxplus cb z \boxplus bz \boxplus fz \boxplus ka z - 1 z$, and therefore leaving out z .

$$g \div \text{---} = z.$$

$$da \boxplus cb \boxplus b \boxplus f \boxplus ka - 1$$

$$b \boxplus f \boxplus ka = \frac{8}{8} = 1 - 1 = 0, \text{ there remains then only } da = \frac{3}{48} \boxplus cb = \frac{11}{80} \text{ both } = \frac{288}{3840}, \text{ which being reduc'd to the least Fraction, give}$$

give $\frac{3}{40}$ for the divisor of $\frac{3000}{1}$, the Product is 120000, which divided by 3, the Quotient is 40000 = 2 the whole Army; and therefore 30000 = Foot, 10000 = Horse, both = 40000 the whole Army. Out of the Foot deserted $\frac{1}{12} \times 120 = 2380$, out of the Horse deserted $\frac{1}{20} \times 120 = 620$, both = 3000, which being added to 12000, the number of the kill'd and Prisoners make up $\frac{1}{2}$ of the Foot; $\frac{3}{8}$ which he kept still = 15000 with $\frac{1}{4}$ sent into Garilons, = 10000 are again the summ of the Army.

The second Problem is conceiv'd in these terms: 'Some young Men and Maids having din'd together, ow'd 37 shillings to the Landlord, whereof each young Man was to pay 3 shillings, and each Maid 2 shillings. But if there had been as many young Men as there were Maids or contrariwise, *Sique fuissent tot Juvenes quot fuerunt Virgines & e contra*, each however paying with the former proportion, they had spent 4 shillings less. It is requir'd to find out the number of the young Men and Maids.

All the difficulty of this Problem consists in understanding that Phrase, which I have inserted in the own words of the Author, for it does not signify that in the 2^d Supposition the young Men and Maids were in equal number, Algebra shewing this to be impossible; but that the question must be alternately understood, and the numbers substituted to each other by turns. Let's then take y and z for the young Men and Maids, a for 3, b for 2, c for 37, d for 33. By the first Hypothesis $ay \mp bz = c$, and therefore $ay = c - bz$. And by the second Hypothesis alternately understood, $az \mp by = d$. Now because $ay = c - bz$, therefore $by = \frac{bc - b^2z}{a}$. And there-

fore $az \mp \frac{bc - b^2z}{a} = d$. Multiplying by a , $aa z \mp bc - bbz$

$= ad$. Subtracting bbz from $aa z$, and bc from ad , remains $5z = 25$ or $z = \frac{25}{5} = 5$. And therefore had they paid 33 shillings, there had been five young Men, and nine Maids; but because they ow'd 37 shil. there were nine young Men, and five Maids.

The third Problem is propos'd by *Henrion*, in his *Commentaries upon Euclid*, Three Merchants associated had gain'd an hundred pound, which they were to divide proportionably to what each had put in the common treasure. The Summ of the first with the Gain was equal to the two others taken together. The Summ of the second with the Gain double to the two others. And the Summ of the third with the Gain also triple to the two others. What was the whole Summ, and the Quota of each Merchant?

This Problem seems very difficult, for here are four unknown quantities, and but one known, *viz.* the Gain, that is only giv'n to determine the Question, lest we should imagine at random three Summs equal, double and triple amongst themselves, and then say that we resolv'd the Problem. Neither do I see any means to find out the whole Summ at once, as we have done in the first Problem, and therefore must needs make three Operations.

Let x, y, z , be the names of the quota's of each Associate, a the Gain. The question will be thus stated in letters, $x \text{ } \text{+} \text{ } a = y \text{ } \text{+} \text{ } z$. $y \text{ } \text{+} \text{ } a = 2x \text{ } \text{+} \text{ } 2z$. $z \text{ } \text{+} \text{ } a = 3x \text{ } \text{+} \text{ } 3y$. Because $x \text{ } \text{+} \text{ } a = y \text{ } \text{+} \text{ } z$, therefore $2x \text{ } \text{+} \text{ } a =$ the whole Summ put in by the three Associates. And now x is something known, we'll make use of it to discover the rest. $y = x \text{ } \text{+} \text{ } a - y$. Adding a on both sides, and multiplying by two, because an Unite cannot divide; $y \text{ } \text{+} \text{ } a = 4x \text{ } \text{+} \text{ } 2a - 2y$. leaving out one a on each side, and putting the y together. $3y = 4x \text{ } \text{+} \text{ } a$. And therefore $y = \frac{4x \text{ } \text{+} \text{ } a}{3}$.

To find out z , I say $x = \frac{3}{3}x$, and therefore $x \text{ } \text{+} \text{ } y = \frac{7}{4}x \text{ } \text{+} \text{ } \frac{a}{3}$. whence follows $z \text{ } \text{+} \text{ } a = \frac{21}{3}x \text{ } \text{+} \text{ } \frac{3a}{3}$, or $7x \text{ } \text{+} \text{ } a$, and therefore $z = 7x$.

As to x , it will give us no trouble, for since we have found that $x \text{ } \text{+} \text{ } \frac{4}{3}x \text{ } \text{+} \text{ } \frac{a}{3} \text{ } \text{+} \text{ } 7x = 2x \text{ } \text{+} \text{ } a$, or the whole Summ. Multiplying all by 3, it follows that $3x \text{ } \text{+} \text{ } 4x \text{ } \text{+} \text{ } a \text{ } \text{+} \text{ } 21x = 6x \text{ } \text{+} \text{ } 3a$, or $28x \text{ } \text{+} \text{ } a = 6x \text{ } \text{+} \text{ } 3a$. and therefore $22x = 2a$; and $x = \frac{2a}{22} = \frac{a}{11}$; $y = \frac{4x \text{ } \text{+} \text{ } a}{3} = \frac{136}{33} \text{ } \text{+} \text{ } \frac{4}{11}a = (45 \text{ } \text{+} \text{ } \frac{5}{11})a$; $z = 7x = 63 \text{ } \text{+} \text{ } \frac{7}{11}a$.

Any common Arithmetician may examine these Operations, for I have set 'em down at large, that young Beginners may learn not only an Algebraical Nicety, but also the method of making Equations, with the reason of each of them. For tho good Sense, Invention and Judgment be the greatest helps to find out Equations, yet a true and plain method is such a necessary improvement of those natural qualities, that they will not go very far without it. This makes me hope that you will take in good part my present Address, knowing the Latin Proverb, *He Nuga seria ducunt.*

Novemb. 18. 1693.

LETTER XLV.

To the Honoured Dr. Richard Morton,
one of the Governours of *Christ's-
Hospital*, and of the Colledge of Phy-
sicians, of *London*.

ARGUMENT.

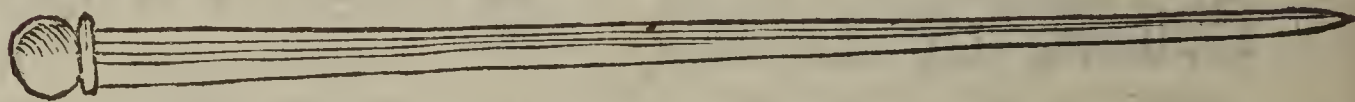
Five strange Relations of heterogeneous bodies extracted, or come out of humane bodies. The fourth Relation inconsistent with Anatomy. The fifth Relation prov'd impossible by the common notion of gravity. Why the Bodkin mentioned in the first Relation came down through the Anus without any Ulceration? Why the Pin mentioned in the second, caus'd an Impostume in the left Buttock? The third Relation explain'd. Incredible smallness of the Seeds and Eggs of some Plants and Insects, and their prodigious numbers. The Circulation of the blood represents that of the Water on the surface of the Earth. Why the Worm, taken out of the incised vein, was carried so far as the extremity of the Arm, and how it was bred and encreased there?

Honoured Sir,

THo the design of these Memoirs engages me to insert some strange *Phenomena* of Physick in these Papers; yet I do not pretend to erect my self into an Interpreter of all the secrets of Nature, since she has a great many, which she keeps conceal'd from her dearest *Mystæ*. I am content with bearing the part of a faithful Historian, who endeavours to distinguish between credible Relations,

and groundless Reports; being neither too ready to believe out of weakness and admiration, nor too forward to reject out of pride and self-conceit. And therefore I take sometimes the liberty to propose my difficulties to the greatest Artists, among whom, the publick voice, your happy Cures, and your Learned Books, have justly rank'd you.

In 1624, one *John Stevinson*, Servant to the Earl of *Anchram*, having the Palate, or *Uvula* of his Mouth down, endeavour'd to pull it up with a Bodkin, five inches long, taken out of a Tweezer, and of the figure that is here represented. But the Palate getting



hold of the broad end of it, which he had put into his Mouth, took it quite out of his hand, where he had only the little end; so that he suck'd it down with his breath. It remain'd five weeks within his Stomach, that he felt but little pain, only if he should chance to lye on the side of the point, it would prick him, and wake him in the night, were he in never so sound a sleep: Afterwards it descended from the Stomach into the small Guts; where by reason of the windings of the bowels, it caus'd such an intolerable pain as to make the Patient fall into frequent swoons. In that lamentable condition, he went to Sir *Theodore de Mayerne* for counsel, who began the cure by the frequent injection of Clysters, made up especially of a good quantity of Butter and Oyl, to open the passages, and make them more slippery. Then he purg'd him with an Infusion of *Sena*, wherein *Manna* and *Cassia* were diluted; which produc'd so much effect as to convey the Bodkin into the great Guts, and by degrees through all the intestines; only it stay'd a month on the right side, where it was thought it would have bred an Impostume, and burst through it. To prevent this, Sir *Theodore* order'd him to go twice a week into a Bath of more than warm Water, and there to drink a pint of Olive-oil with Sugar, to drink another pint of Oyl every morning, a quart of Whey an hour after, and to make as much exercise as he could. By these laxative liquors, the Bodkin was carry'd away as by a torrent, and voided with the excrements, without any exulceration, nor even inflammation. The pain had brought the Patient very low, but soon after he recover'd a perfect health. He was yet alive 22 years after, *June 17, 1647*, being then 50 years of age; at which time, he subscrib'd an attestation of the

the matter of fact. that I have in my hands ; in which 'tis observ'd, that he had still the Bodkin to shew, and that it had been in many Kings, Queens, and Princes hands.

Mr. Dupuy, a learned *French* Physician, whom the late persecution has forc'd to take Sanctuary in this Country, has communicated to me an observation of his of the same kind, but with different and remarkable circumstances. In the month of *May*, 1669, being at *Fontaine-le Comte*, Capital of Lower *Poitou*, he was fetcht by a Surgeon for a sick Woman, whom he found lying in bed. She told him that ever since 6 months, she had been troubled with a violent pain in the middle of the left Buttock. But coming to view that part, he perceiv'd there neither pulsation, heat, inflammation, tension, nor any other of the accidents that use to preceed Impostumes. However feeling that her Pulse was irregular, seeing her face overheated, and hearing her complain of a violent thirst, he judg'd that in the middle of that Buttock, there was an interior Impostume, chiefly because she was troubled with a languishing Fever that redoubled upon her every evening. And therefore he ordered the Surgeon to prepare a dressing, and then to pierce the affected part with a Lancet, but there came nothing out of it. The Woman was notwithstanding dress'd. This was done in the morning ; about six in the evening the Physician and Surgeon came again, and as soon as the Tent was taken out of the opening, there came out a full pint of a purulent matter as black as Ink.

Lest an excessive evacuation should bring the Patient into a Swoon, Mr. *Du Puy* order'd another dressing to be quickly applied to it. The following day he found this Woman very weak ; for the corrupt matter had thrust the tent and plaister from the wound, besides that, the Patient complain'd of an intolerable smart, that she felt just at the hole of the Ulcer. Our Physician prying into the wound to discover the cause of that pain, perceived something heterogeneous, that would, as it were, come out of it self. Whereupon taking the Surgeon's Pincers, he extract'd out of it a great Pin, such as the Country People there use to tye their Shirts with. That sort of Pins are somewhat uncommon here, and the figure of it will shew this relation not to be impertinent.



Inquiring into the cause of this strange Phenomenon, he was told by the Woman; that 3 months after her Marriage, as she was in a Summer evening hunting the Fleas of her Smock, she found this Pin on the ground, which she put into her mouth. Her Husband who was in bed rising softly came and gave her a blow on the Buttocks; which frightening her, made her swallow the Pin, that had remained 3 years in her body, when it came out through this Impostume. *I have kept this Pin, says Mr. Du Puy in a Letter to me, to the time that the Persecution drove me out of France, and shewn it to every curious. The cure was finished with digestives and injections, and the Woman was well in health, when I went out of the Kingdom.*

The same Gentleman has related me another story, that has appeared incredible even to an ingenious Physician, viz. That being once present at the bleeding of a Lady, one of his Patients; the blood, after it had sprung out in the quantity of about two ounces, staid on a sudden: and as he was looking for the cause of it, he perceived an heterogeneous body that stopt the opening of the vein, whereupon taking the Surgeon's small Pincers, he drew out a Worm as big as could come out of the incision.

I have by me an original Letter dated from Grendon, February 10. 1668. and written by one Ann Aubrey, wherein she asserts as a truth that a Pin past through the Elbow of a Kinswoman of hers, where she had a great pain, and that their Son, Skimper, by handling of it felt the proportion of a Pin, and by the clear light of the Sun did discover its point, which was to their great admiration, and caused the whole Family to come and see it. After that with his own hands, by some instrument, he drew it out without any great pain, and the Patient had not ever since any great pain in that arm. *It was conceiv'd by many able Doctors that the Pin being swallow'd was conveyed from the Liver by the blood into the Arm.*

The Gentleman who has communicated this Letter to me, assures me by another to have read in Sir Theodore de Mayerne's papers, that a woman that had swallow'd a Pin was some time after seized with a violent Head-ach, upon which ensued a swelling inflammation and ulcer at one of her ears, whence the Pin was extracted.

But notwithstanding the respect I have for that ingenious friend, and for Sir Theodore de Mayerne's memory, I cannot believe these two last stories. The reasons of my incredulity are, that whatever descends as far as the throat, is thrust down by the root of the tongue as by a shovel, and by the successive dilatation and compression of the gullet, into the stomach, where if it be a matter that can be diluted by the ferment of that *Ventricle*, it will be bruiz'd and reduc'd into a thick grey pap, and let down through the inferior mouth,

mouth of the stomach into the small guts. But if it be a hard substance, as a Pin, it must needs stick or remain there, till by some strong fermentation that pap be made very liquid, and the hard substance carry'd down, as by a flood into the said small guts. There the bruiz'd matter, which we call *Chyle*, undergoes a second fermentation, running along the *Duodenum*, (a) *Jejunum* and *Ileum*, by an acid coming out of the *Pancreas*, an acrimonious liquor flowing out of the Liver, and a lymph squeez'd out of the glandules of the Intestines. This abundance of different liquors render the *Chyle* extremely fluid, precipitate his gross and terrestrial parts, and whatever is not proper for nutrition, which descend through the *Cæcum* (b) and *Colon* into the *Rectum*, there to remain till they be in so great a quantity that by their own weight they may dilate the *Sphincter*, and open themselves a door to be evacuated, under the name of excrements. In the mean while the most subtle parts of the *Chyle* transpire, or are imbib'd, by a glandulous or pappy substance, that is the fourth tunic of the small guts, and has communication with the milky veins. From these veins the subtiliz'd *Chyle* runs into the glandules of the *Mesentery*, where it is filtrated and diluted again by a lymph carried thither from several Vessels. Then going through the two glands call'd *Lumbaria*, it ascends through two branches into the *Canalis Thoracicus*, or Channel of the Breast, which discharges it into the *Subclavia Vasa*, and those into the *Vena Cava*, that carries it to the heart, where by its mixture with the blood it undergoes a new fermentation, and takes the name and red colour of the blood. Both are forc'd by a *Systole*, or contraction of the heart into the lungs, whence they descend through the *Pulmonarian* vein into the left ventricle of the heart to be fermented again, indued with all the qualities of blood, and driven by another *Systole* into the great artery, which distributes it through all the members, both above and under the heart.

(a) The
Names of
the Small
Guts.

(b) The
Names of
the Great
Guts.

He that understands the words sponge, glandule, filtration, membranaceous substance, who knows that the lacteal and lymphatick veins, the channel of the chest, the small and great guts have *valvules*, or folding doors, which hinder the matter that is driven into those vessels from running back, and that the blood must pass through veins and arteries of an incredible smallness, before it can be carried into the arms, will not be apt to believe, that such a gross body as a Pin can penetrate so far as the Elbow.

The fourth story of the Pin coming out through the Ear, is liable to difficulties that are still more sensible than the former. 1. We use not to say that a thing has been swallow'd, unless it has past the
root

root of the tongue, and entred into the gullet. 2. When liquors or chew'd meat are descended so far, they are necessarily thrust down, partly by their own weight, and partly by the contraction of that membranaceous pipe. 3. We know that Iron is much heavier than an equal quantity of liquor and chew'd meat. If therefore liquors and chew'd meat fall into the stomach by their own weight, by what engins can a Pin come up, and ascend as far as the tympanon of the Ear?

It helps not to alledge, that there is a sensible hole or cavity going from the Ear to the Palate, to give passage to the air, which if it were altogether shut up, a violent sound would break the small bones, skins and membranes that inserve to the hearing. And accordingly it has been observ'd, that a deaf person may be made to hear the sound of a Lute, if it be plaid upon whilst he holds its neck betwixt his teeth, the air or sound let in through this passage striking the inward side of the tympanon of the ear, which communicates this tremulous motion to the nerves and fibres of hearing that end at the common sensory. If this observation prov'd true, it would be useful to make the deaf hear, by speaking into their mouth through some resounding instrument. But however it be, it will not avail any thing as to the present case, since tho' propuls'd air can thrust up other air, yet it will never follow, that a mass of Iron, proportionably equal to another of liquor and chew'd meat, can ascend upwards, whilst the weight of the latter forces them to go down.

As to the first and second relations, I believe them to be true. 1. Because the Bodkin and the Pin went not through any veins, arteries or muscles, through the heart, the lungs, or the liver, which would be impossible, but descended immediately into the stomach, whence they were carried into the bowels, more or less slowly, according to the quantity of liquor in which they swam. 2. The spiral situation of the bowels would have rendred the passage of these long, sharp and rigid bodies impossible, if the intestines were unmoveable; but because they have a *Peristaltick* and *Antiperistaltick* motion, that is, that they move to and fro, according to the course of the *Chyle* and humours, turning about themselves like worms, this motion help'd by degrees the passage of these heterogeneous bodies; which tho' they might often stick in some part of the bowels, yet were afterwards taken off by overflowing liquors. 3. Its by these inward floods, that the pain of *John Stevinson* was eased, and the Bodkin carried away without ulceration; the many mollifying injections, purgarives, oyls and baths, which he used by Sir *Theodore's*

dore's directions, preserving the bowels from the sharpness of the Bodkin, stretching them, furthering their motion, and making it slide more easily. But as to the Woman who had swallow'd the Pin, because she used no remedies, that heterogeneous body might well be brought down by its own weight, and the natural motion of the Intestines, not being half so long as the Bodkin; but it being sharp, was apt to stick at length in some parts of the *Rectum*, as it did also.

To explain the third History, I suppose 1. That the seeds and Eggs of some Plants and Animals are of an incredible smallness, tho they contain all the essential and integrant parts of that plant and animal, which come to be unfolded in time, proportionably to their increase. For instance the seed of an Aspin tree has scarce half a line in length, and produces however a tree several fathoms high 2. Because our Eyes are dim and short-sighted, we ought not to judge that those plants and animals, whose seeds and eggs we cannot discover, are produced at random, or by an equivocal generation; but considering that nature is constant and uniform in her operations, we ought rather to believe that she follows still the same course, bringing forth all plants and animals out of seeds and eggs, tho we cannot always perceive them, either because of their own smallness, or of some outward impediment. 3. The use of Microscopes having discover'd in this Age a vast number of Seeds, Eggs and insensible Animals that had been hitherto unknown, it is but rational to conclude, that were our instruments better, our diligence and accuracy greater, and nothing hindered us to pierce to the very bottom of things, we might find out the true causes of whatever a presumptuous Ignorant ascribes to chance or occult qualities. Mr. *Leuwenhoek* assures that in (a) 15 cubical inches of Spawn, which a Cod-fish may emit in a year, there are ten times more living Animals than Men upon the face of the Earth; that he has seen likewise a prodigious number of these insensible creatures, in the spawn of Pikes, Trouts, Carps and Tenches, as well as in the sperm of Dogs and Cocks. And it can hardly be said that these suppos'd animals are but particles of the fermenting spawn or sperm, because they live a considerable time after they are taken out of the animal. 4. This at least is certain, that all animals whatsoever come out of worms, which move, and receive nourishment, and increase as soon as the Mother has conceiv'd. This is sensible even to the bare eye in Embryo's that are taken out of female animals, which approach more or less of the figure of a Worm, as the time when they were extracted is near or remote from their conception. 5. Some Plants, which the ancient Herbalists suppos'd to be produc'd without seeds,

(a) *Ondekte
Onzicht-
baarheden.
Leyde 4.
1686.*

(a) See
Letter XXX.
p. 229.

as the Fern, the Wall-rue. *Ruta muraria*, the Wool-blade or Moonwort *Lunaria*, the *Polypus*, the Hart-tongue, the Serpent tongue, the *Capillary* of *Montpellier*, &c. have been found to have not only small seeds, but some of 'em Cods fill'd with two or three hundred grains, and these Cods however are insensible to the eye. 6. Flying Insects (a) lay also a prodigious number of Eggs, which may be hatch'd out into Worms, within 24 hours, if they light on a convenient warm place; and quickly increase to a considerable bulk, if they find abundance of food. 7. Tho all such Worms come out of the Eggs of flying Insects, and may be transmuted into them, yet this transmutation is not always made, because want of air, room, and other conveniences may hinder it. 8. The circulation of the blood may be represented by that of the Water on the surface of the Earth, imagining the heart to be as the Ocean, the extremities of the body the places of the Springs, the small and great veins the Brooks and Rivers, that carry that vivifying liquor to the heart, and the arteries the subterraneous Channels, that bring it again from the heart to the extremities of the body.

After these few postulates, which are almost undeniable, our third relation has little difficulty in it. 1. The Egg of some flying Insect had been swallowed with meat by this woman (for Flys use to lay their Eggs in places where they may find food as soon as they are hatch'd out) 2. This Egg being descended into the Small Guts, was not forced down with the excrements, being as small and light as any particle of the *Chyle*, and went therefore with them into the milky veins through all the pores of the filtering glandules, the heart, the lungs, the *Aorta*, till arriving at last to the extremities of the fingers, it remain'd there intricate amongst their small arteries and veins, and was there hatch'd out by the most convenient and natural heat of the blood and flesh. 3. Having thus gotten the life and motion of a Worm, it swam for greater ease and room into the arm above the fist, and following still the cherishing liquor wherein it was bred, it came to the incision of the vein, whence Mr. *Du Puy* extracted it.

December 1.

LETTER XLVII.

To the Right Reverend Father in God,
Henry Lord Bishop of London.

ARGUMENT.

Occasion of this Letter. Judgment of Calvin, Piscator, Pool and Hammond. A Paraphrase of the first nine Verses of St. Matthew, Chap. iv. The precise time of Christ's Temptation. What Motives led him over into the Desert. Whether the Devil knew the Mystery of our Redemption? Whether his carrying over of our Saviour was real? Which is the natural Order as to this Narration, that of St. Matthew, or that of St. Luke? How the Houses of Jerusalem were built? How the Devil might shew to Jesus all the Kingdoms of the World, and their Glory?

My Lord,

When I began to write in the *English* Tongue, I presum'd to dedicate the first Month of my *Works of the Learn'd* to your Lordship, not only by a Motive of general Gratitude for the Paternal Care you have taken of the persecuted Protestants of my Nation, but more particularly as being your Lordship's spiritual Son, and a Member of this most pure Church by your Consecration.

But since Sons are either the Glory or the Shame of their Father, it is but just that I should give you an account of the progress of my Studies. I am forc'd every day to write upon very nice matters, and have almost no other humane Succours but my own Imagination, my Library being very small, and most of my former Notes and Papers having been lost, by several accidents. In the

mean while I oft receive Commendations or Censures from several persons according to their Prejudices; and therefore being near the end of my career in this undertaking, I thought fit to follow the establish'd course, and to submit all to your Lordship's Judgment, being persuaded that your Learning and Prudence is so great, as that you will not fail to encourage me to continue these *Memoirs*, if they are worth your Lordship's perusal.

In the XLI Letter I have unawares started a difficulty, which I know not whether I shall be able to resolve. An anonymous person has reproach'd me, that I promis'd more in the Arguments, than I could perform in the Letters, as when I write there, *Christ's Fast and Temptation explain'd*; whereas, said he, you have made but a short Paraphrase on the two first Verses. I answer'd, that my design at that time requir'd no more; however that I was willing to try whether I could explain this History, one of the most difficult in all the Gospel.

Coming home, the first Book that fell into my hands, was *Calvin's* harmony on the three first Gospels: A most eloquent and judicious Author, who was extraordinary well acquainted with the diseases and necessities of his time, and knew best how to cure them; but his many occupations, and the studies of his Age did not afford him a sufficient insight in the knowledge of Tongues, and critical Learning. Then I read over *Piscator* upon this place, but could not find an observation for my purpose, all that he says is so very mean and scholastical. I thought therefore that the Modern Commentators would be more helpful to my design, and accordingly I got the celebrated *Pool* in *English*, who seem'd to me more proper for some sort of Preachers, than for a Critick. At last I consulted the learned *Hammond*, in whom I found but three Notes on the words $\Delta\iota\alpha\beta\omicron\lambda\omicron\upsilon\sigma\iota\varsigma$ & $\pi\epsilon\tau\epsilon\lambda\epsilon\upsilon\sigma\iota\varsigma$, so that at the end of all my reading, I was got no farther than the beginning.

Then I read over and over the *Greek* Original, and fram'd thereupon the following Paraphrase.

Ver. 1. 'About the end of the Month of *September*, or the beginning of *October*, in the 30th year of our Saviour's life, as soon as he had been baptiz'd, he was led by the direction of the Infinite Wisdom, with whom he was hypostatically or most intimately united, and of whose gifts he had receiv'd a new increase in his Baptism, *Matth. iii. 16, 17.* so that he was as full of the Holy Ghost, *Luke iv. 1.* He was led, I say, into a solitary place, situated above the River *Jordan*. His intent, as a Man, was to prepare himself in that retirement for the important office to which he had been con-

secra-

‘secrated, and to implore the blessing of his Father upon his future labours; but the design of the Infinite Wisdom, was to let him obtain a glorious Victory over the great Adversary of Mankind.

Ver. 2. ‘Being come there, the vehemency of his Zeal and Prayers carry’d him into an extatick ravishment, that lasted 40 days and 40 nights, at the end of which, his body resuming his natural functions, he felt the sharpness of hunger.

Ver. 3. ‘Then the great Seducer of Spirits came near him, in a visible and pleasant shape, dissembling his inveterate hatred and malice, under pretences of friendship, as tho he had been a good Angel much concern’d for his circumstances. This place, says he, affords no sustenance, nor the season any wild fruits; but what need you to lie in that anguish, and willingly starve your self; since you are the Son of God, as you persuade your self, by the voice you heard, before you came hither; you have no more to do, than to command these stones to be turn’d into bread.

Ver. 4. ‘It’s true, answer’d Jesus, I am intimate with the Infinite Wisdom, but ’tis only to perform her commands, or to follow the motions she is pleas’d to give me, and not by murmuring and impatience to force her, in a manner, to comply with my appetites. This would be a sin like to that of the *Israelites*, who, tho they had receiv’d so many deliverances from the Almighty, never rely’d fully upon him. As for me, I am persuaded, that God-being all good and unchangeable, he will never forsake me, and therefore that rather than to let me perish, he will cause a new *Manna* to rain from Heaven. For as *Moses* intimates, *Deut. viii. 3.* bread and meat are indeed the ordinary, but not the only food of Man: God’s word and providence may supply the want of those aliments, and keep him by other means.

Ver. 5, and 6. ‘However, reply’d the tempting Spirit, I would not trust so much upon my own Revelations, for they may be mistakes of the Senses and Imagination, come with me to *Jerusalem*, I’ll put you in the way to know certainly whether God be so much your Friend, as you believe. Being arriv’d there, he plac’d him on the top of the Temple near the Battlements, and pursu’d thus his discourse: You are almost starv’d, and have but few days, and perhaps few hours, to live. Put an end to your miseries. Cast your self down head-long; for if you really be the Son of God, he will order his Angels to take care of you, and to bear you up as in their hands, lest you should dash your foot against a stone, according to the solemn promise of the Prophet, *Psal. xci. 11, 12.*

Ver.

Ver. 7. 'No, answer'd our Saviour: This would be again the Sin
' of the mistrusting *Israelites*, who were never satisfy'd, what favors
' soever God bestow'd upon them. I have receiv'd sufficient
' proofs of his love and beneficence, and do not require any more,
' remembering that Precept of his Law, *Thou shalt not tempt the Lord*
' *thy God*, Deut. vi. 16.

Ver. 8, 9. These wise Answers might have discourag'd any other
besides the most obstinate and wicked of all spirits, but he had still
an arrow in his quiver, which he would shoot at that invulnerable
breast: 'Whatever I may say, pursu'd he, I cannot persuade you to help
' your self; but I have so much love for you, that I will yet endeavour
' to do it. Whilst he spake thus, he carry'd *Jesus* upon a Mountain ex-
ceedingly high, where, disposing as much matter as he has power to
move into the image of the utmost grandure and magnificence of
this world, as may be the stately entrance of a *Roman* General on a
Triumph-day, he added: 'I know what you aim at, you would
' fain be acknowledg'd by your Nation for the Messiah, and I own
' that you resemble him very much. However, I dare tell you that
' it will never succeed, because they long for a temporal King, and a
' Conqueror that may deliver them from the *Roman* Yoke, and sub-
' due the rest of the world. But you want Riches, the main sinews
' of War and Government. This it is in my power to give, for I
' am one of those great Angels, whom God has intrusted with the
' government of the world, *Dan. x. 13, 20.* and I will bestow it upon
' you, if you will become my Servant; and, for a token of your
' engagement, cast your self to the ground, and worship me.

Ver. 9, 10. Jesus had been ere now sensible, that this fair Pretender
was a wicked Spirit, since good Angels are not us'd to discourage
pious Men. However, according to the Rules he has given himself
against light and uncharitable Judgments, he had patiently born all
this Seducer's Temptations to this very last, when he broke out in
these words full of a just and holy indignation: 'Get thee hence,
' Satan, sworn Adversary of God and Mankind. Art thou not a-
' sham'd, to pretend even to Adoration, that supreme homage of our
' Soul, which God has reserv'd to himself, since 'tis laid in his Law, *Thou*
' *shalt worship the Lord thy God, and him only shalt thou serve*, Deut. vi. 13.

Some sort of People will perhaps wonder at this Paraphrase, but
I leave your Lordship and the impartial Reader to judge of it, after I
have added some few Notes.

Ver. 1. *Tότε, Then.* Jesus was about 30 years of age when he was
baptiz'd, *Luke iii. 23.* He dy'd about the end of *March*, after ha-
ving preach'd three years and a half, according to the common opi-
nion,

nion, which may be easily made out of the Gospels, and therefore this History happening immediately after his Baptism, fell out about the end of September, or the beginning of October.

Jesus was led up of the Spirit into the Wilderness : ἀνύχθη, led up, in the Hebrew Phraseology denotes, that this solitary place was in a higher situation than the River Jordan. This is observed, that the Jews of that time might know where that miraculous Scene had been acted.

To be tempted by the Devil. Some supply the Adverb ἐνεκα before πειρασθῆναι, to the end that he might be tempted; but I rather understand the Participle μέλλων ubi futurum erat, where he was to be tempted. Because tho this Temptation, and the subsequent Victory, might be the principal aim of the Infinite Wisdom, yet she did not always reveal to our Saviour, whatever she design'd concerning him and his Church, Mark xiii. 32.

Ver. 2. And having fasted forty days and forty nights, &c. Concerning this Ecstatic Fast, the Reader may see the XLI Letter of these *Memoirs*, p. 313.

Ver. 3. If thou be the Son of God. Since neither the Prophets, nor the good Angels, did perfectly know the Mystery of our Redemption, before it was fulfill'd, 1 Pet. i. 10, 11, 12. there is little appearance that the Devil, whose knowledge of future Events is grounded upon meer conjectures, should have been better acquainted with it. Neither is it probable that by his oppositions, as the possessing of so many Men, the stirring up of the heads of the Jews, the seducing of Judas, the persecuting of the first Christians, &c. he would have concurr'd to its performance; had he been certain that it was by the death of the Messiah, and the sufferings of his first Disciples, that Mankind was to be sav'd, and the Gospel to be spread through all the world. He might know that Jesus was the Messiah, as being born at Bethlehem, and of the Family of David, and the time of that great Deliverer's coming being fulfill'd. But as to Christ's or God's designs, and the manner of their performance, he was altogether unacquainted with 'em, and so very false in his conjectures, that he always mistook, as appears by his unsuccessful contradictions. And therefore I am apt to believe, that he went to that solitary place, in order to find out our Saviour's intention, to deter him from them, or to seduce him, if possible.

Ver. 5. Then the Devil takes him up into the Holy City, the surname of Jerusalem, Psal. xlviii. 1, 2. Matt. xxviii. 53. Luke iv. 9. The Greek word παραλαμβάνει, translated takes up, does not plainly mark whether the Devil carry'd over Jesus through the Air, or whether they

they walk'd together so far. The latter appears more natural, but the former seems more agreeable with the circumstances of the History. 1. Because the Temptation lasted but few hours, otherwise our Saviour would have known, detested, and sent him away, as he did when that proud Seducer endeavour'd to intice him to Idolatry; for the shrewdest Villain in the world will discover himself in a long conversation, in which he labours to persuade an honest and ingenious Man to wicked Actions. 2. Because a fasting Man cannot run very swift, neither must we have here recourse to a miracle; for it seems that the Infinite Wisdom left in this occasion the Man *Jesus* to himself, that his humanity might have the whole glory of this great victory, and be a worthy subject of her love and union. 3. Wherever soever the Desert and Mountain mention'd in this History be situated, they are not near *Jerusalem*; so that ordinary walking would have requir'd too much time. 4. *Jesus* might have been known in the way, and taken off from the company of the wicked Spirit. It must not be objected, that this carrying over would have frighted our Saviour, for a good Conscience, especially such an untainted person as he was, fears nothing. Besides, that he knew how often Prophets had been carry'd over by the Holy Ghost or good Angels.

St. Luke relates the third Temptation before the second, but the order of *St. Matthew* is the true thread of the Narration, as will appear to any considering Man. God has suffer'd such transpositions to slip into the Gospels, that any one might see there was no private Plot amongst the Historians of his Son, but each of them mention'd what he knew of him, to the best of his remembrance:

And sets him on a pinnacle of the Temple. As Rain is not frequent in *Judea*, so the top of the houses in *Jerusalem* was flat, and surrounded with Battlements, so that People could walk upon them without danger. And I remember to have read in the *Uses and Customs of the Jews*, written by *Leo of Modena*, an Italian Rabby, that they celebrated the Feast of the Tabernacles on the top of houses, especially in great Cities; so that ἐν τῷ πτερύγιον, signifies on or near the Battlements.

Ver. 7. Jesus said to him, it is written again. The learn'd *Knatchbully* would have us read and translate thus, *Jesus said to him again, 'tis written.* But I prefer the common reading and translation, because πάλιν again is not here superfluous, both passages alluding at the diffidence of the *Jews*.

Memoirs for the Ingenious.

363

Ver. 8. And shews him all the Kingdoms of the world, and the glory of them. That this was not done in a Vision, is plain by the Text ; for *Iesus* was hungry when the Tempter came to him, *ver. 2, 3.* And 'tis absurd to assert, that part of the Temptation was perform'd whilst our Saviour was awake, and the other in a Vision or a Dream. Besides that, the Devil to raise such perceptions in our Lord, without the help of outward objects, must have immediately mov'd the fibres and nerves of his brain, or determin'd the course of his vital spirits to such and such motions. A power, which, in my opinion, a wicked spirit never had over just Men ; for otherwise, who could resist his temptations, the Soul being so dependent on the Body ? Neither is there any Mountain so high, that all the Kingdoms of the world may be seen from it, nor any eyes so piercing that they may discover all their glory. And therefore this Phrase is a popular expression, to signify that the great Seducer represented him by the help of exhalations and aerial corpuscles, whatever can best flatter ambitious Souls, or an Image of the most stately pomp and magnificence of this world, as the Coronation of a great King or Emperor, or the Triumph of a *Roman* General, one of the three wishes of *St. Austin.*

Decemb. 4.

F I N I S.

The CONTENTS.

Letter XLIII. <i>Whether Nebuchadnezzar was really transmuted into an Ox ?</i>	Pag. 331
Letter XLIV. <i>Solution of three Algebraical Problems.</i>	344
Letter XLV. <i>Of Bodies swallow'd up by Men, and come out or extracted out of their Bodies.</i>	349
Letter XLVI. <i>Paraphrases and Notes on the History of Christ's temptation.</i>	357

F I N I S.

